







Northern Spy Apple



Ingram Apple



Rhode Island G



Winesap Apple



Randolph Apple



Cardin



Carman Peach



Great Cat's Head Pear



Phi



Brittlewood Plum



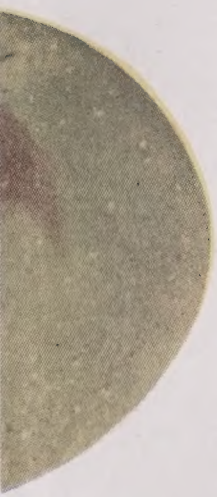
Sugar Prune



Hiley Peach



Red



ing Apple



rawberry



a Pear



Plum



York Imperial Apple



Akin Apple



Terry Apple



McIntosh Apple



Diel's Butter Pear



Welch Peach



Willett Peach



Splendor Prune



Robert's Field Apricot

THE STANDARD AMERICAN ENCYCLOPEDIA

*A Dictionary
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volumes—Fully illustrated*

VOLUME VI

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THE STANDARD
AMERICAN ENCYCLOPEDIA

IN EIGHT VOLUMES—FULLY ILLUSTRATED

Volume VI
ORPIMENT—SALT RANGE

Orpiment, in mineralogy, an orthorhombic mineral occurring sometimes in crystals, mostly as cleavable masses, earthy, or as incrustations. Hardness, 1.5-2; sp. gr., 3.48; luster, pearly on fresh cleavage faces, becoming dull on exposure; color, lemon yellow of various shades. Thin laminae, flexible. Composition: Sulphur, 39.0; arsenic, 61.0 = 100. Found in metalliferous veins with realgar at many localities.

Orr, Hugh, a Scotch-American inventor; born in Lochwinnoch, Scotland, Jan. 13, 1717; came to America in 1737, and settled in Bridgewater, Mass., where he built a factory for the manufacture of scythes and axes, and set up the first trip-hammer in that section. In 1753 he invented a machine for dressing flax. He was an ardent patriot in the Revolutionary War and erected a foundry where he cast cannon and shot, for the army. He died in Bridgewater, Mass., Dec. 6, 1798.

Orrery, in astronomy, a planetary machine to illustrate and explain the motions of the heavenly bodies; once in scientific repute, now regarded as a toy.

Orrery, Earl of. See BOYLE, CHARLES.

Orris Root, in botany, the rhizome of *Iris florentina* and *I. germanica*, sometimes called violet-scented orris root.

Orris-root starch, the starch or flour of the root of *I. florentina*, used in the manufacture of violet powder, and for scenting snuffs. The granules are longer than broad, round at one end, truncate at the other. The hilum is a short slit, from the center of which run two straight lines forming an acute angle.

Orsini, one of the most illustrious and powerful families of Italy. It became known about the 11th century, and had already acquired high rank and extensive possessions in the Papal States when one of its members, Giovanni Gaetano, was raised to the pontificate under the title of Nicholas III. (1277-1280). The feud between the Orsini and Colonna families is celebrated in history; it commenced toward the close of the 13th century, and is distinguished for bitterness, unscrupulousness, and violence, assassination being not infrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII.) succeeded Innocent XIII. as Pope in 1724. The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini of Piedmont.

Orsini, Cardinal. See BENEDICT XIII.

Orsini, Felice, an Italian revolutionist; born in Meldda, Italy, in 1819. In 1838 he was sent to study law at the University of Bologna, and joined the Society of Young Italy, formed in 1831 by Mazzini. In 1843 he took an active part in an insurrection,

and being apprehended along with his father, also an ardent patriot, was sentenced to the galleys for life. By the amnesty of July 16, 1846, he obtained his freedom, but soon after he again engaged in intrigues under Mazzini, and took prominent parts in the stirring events of the following years. In 1855 he was condemned to death, but the sentence was not carried out, and in 1856 he escaped to London. Here he wrote his work "Austrian Dungeons in Italy" (1856), and lived by giving lectures on his adventures. He now planned the assassination of Napoleon III., as the main prop of reactionary tendencies in Europe in concert with three Italian refugees, Rudio, Gomez, and Pieri. The attempt was made on Jan. 14, 1858, but was unsuccessful, and Pieri and Orsini were executed March 13, 1858.

Orsova, the name of two towns on the Danube near the Iron Gates. OLD ORSOVA, a Hungarian place, is 478 miles S. E. of Vienna, and is a station for the Danube steamers. NEW ORSOVA, on the Servian side, is a fortified town held by Austria (since 1878), who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In 1890-1896 a costly canal and other works were made for facilitating navigation at the rocky bend called the Iron Gates.

Orsted, or Oersted, Hans Christian, a Danish physicist; born in 1777; studied at the University of Copenhagen; spent several years at the expense of government in Holland, Germany, and Paris; was in 1806 appointed extraordinary Professor of Physics at Copenhagen; and in 1812-1813, while on a second tour in Germany, he drew up his views of the chemical laws of nature, which he afterward published in Paris under the title of "Researches on the Identity of Electrical and Chemical Forces." His fame first became diffused over the scientific world in 1819 by the discovery of the fundamental principles of electromagnetism. In 1829 he became director of the Polytechnic School of Copenhagen, and on the occasion of his jubilee festival in 1850 he was created a privy-councilor. He died in Copenhagen in 1851.

Ortegal, Cape, the N. W. point of Spain.

Ortelius, the Latin form of the name of ABRAHAM ORTELL, or ORTEL, who, born of German parents in 1527 at Antwerp, where he also died in 1598, published the earliest atlas under the title, "Survey of the World" (1570); a critical work on ancient geography, reissued, greatly improved, as "Treasury of Geography" (1596); and other geographical works. He was also a frequent traveler to England, Ireland (1577), and Italy, and the countries between.

Orthez, a town in the French department of Basses-Pyrénées, on the right bank of the Gave de Pau, 41 miles E. of Bayonne. The "Tower of Moncade" (1240), the stately castle of the counts of Foix, which Froissart visited in 1388, was reduced to a ruin by Richelieu. Near Orthez Wellington gained a decisive victory over Soult, Feb. 27, 1814.

Orthite, a silicate of aluminium containing the rare metals cerium, lanthanum, didymium, and yttrium, occurring in granite and other rocks in Sweden, Greenland, the Ural, etc.

Orthoceras, a large genus of common fossil cephalopods. The shells are quite straight, but a gradual series of forms lead on to the nautilus type. Some species of orthoceras were gigantic; thus *O. titan* in its fossil state is said to have weighed some tons.

Orthoclase, in mineralogy, a monoclinic species of the felspar group of unisilicates of Dana. Hardness, 6-6.5; sp. gr., 2.44-2.62; luster, vitreous when pure, cleavage planes of altered kinds sometimes pearly; color, white, gray, reddish; transparent to translucent; fracture, conchoidal when obtained. Composition: Silica, 64.6; alumina, 18.5; potash, 16.9 = 100; soda sometimes replaces a part of the potash. Dana distinguishes the following varieties: 1. Ordinary, (1) adularia, including moonstone and valencianite; (2) sunstone, or aventurine felspar; (3) necronite; (4) amazon stone, now referred to microcline; (5) erythrite; (6) sanidine, or glassy felspar; (7) chesterlite, now referred to microcline; (8) microcline of breithaupt; (9) loxoclase; (10) paradoxite; (11) cottaite; (12) muldan; (13) lazurfelspar; (14) perthite; (15) murchisonite. 2. Compact orthoclase or orthoclase-felsite, including massive kinds constituting rocks; it is an essential constituent of many rocks, granites, gneisses, syenites, etc.

Orthodox, holding the right or true faith; sound in opinion or doctrine; especially in religious opinions or doctrines; opposed to heterodox and heretical.

Orthodox City, Thessalonica (the modern Salonica). It was for centuries a bulwark of Christianity, but in 1430 it was captured by Amurath II.

Orthoepy, the art of uttering words correctly; correct speech or pronunciation.

Orthographic Projection, in geometry, that projection in which points are projected by means of straight lines drawn through them, perpendicular to the plane of projection. All the projections of descriptive geometry are orthographic, also that particular kind of spherical projection called the orthographic projection. The name is almost exclusively applied in the latter case.

The orthographic projection of the circles of the sphere may be regarded as the perspectives of the circles, the point of sight being at an infinite distance from the principal plane, or plane of projection, which is, in this case, the perspective plane.

Orthography, the art, practice, or habit of spelling words correctly according to the recognized usage; correct or proper spelling; as, the orthography of a word. Also that part of grammar which deals with the nature and properties of letters, and with the proper representation by letters of the words of a spoken language. In architecture and draughting, the elevation of a building, showing all the parts thereof in their true proportions; the orthography is either external or internal. The external is the delineation of the outer face or front of a building; the internal is a section of the same.

Orthopædia, a branch of medical science relating to the cure of natural deformities. Hippocrates already occupied himself with the correction of deformed bones, but it was not till a comparatively recent epoch that this important subject met with the serious attention it deserves. Several institutions for the cure of bodily malformations were founded in France and Germany in the early part of the 19th century. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing, and exercise; that of the latter to correct deformities already existing by mechanical treatment, which is most successful when resorted to as soon as any deviation from natural shape manifests itself. In our time the manufacture of orthopædic apparatus has become highly developed, and forms an important branch of trade.

Orthoptera, in entomology an order of the class Insecta, having four densely reticulated wings, the anterior more or less coriaceous, the posterior folded under them, and membranous; sometimes apterous. In the most typical groups the wings are deflexed and closely applied to the body. Mouth mandibulate, metamorphosis incomplete. The order is now usually divided into two sub-orders. *Pseudoneuroptera*, and *Orthoptera genuina*. The true Orthoptera have been arranged in the following families: (1) *Blattidæ* = the order *Dictyoptera* of Leach; (2) *Forficulidæ* = the order *Euplexoptera* of Westwood and the group *Dermatoptera* of Burmeister; (3) *Mantidæ*; (4) *Phasmidæ*; (5) *Gryllidæ*; (6) *Locustidæ*; (7) *Acridiidæ*. By some authors the *Blattidæ* are made a group, *Cursoria*; the *Mantidæ* and *Phasmidæ* forming the *Gres-*

soria, and the last three families the *Sallatoria*. By others the *Mantidæ* and *Phasmidæ* are placed in the *Cursoria*, but nearly all agree in adopting Westwood's classification for the *Forficulidæ*. The order came into existence in the coal-measures.

Ortler=Spitze, or **Ortler**, a mountain of the Alps, in Tyrol, near the borders of Switzerland and Italy, the highest of the Austrian and German Alps; height, 12,814 feet. The group to which this mountain belongs is known as the Ortler Alps.

Ortolan, a gardner. In ornithology, *Emberiza hortulana*, a native of continental Europe and Western Asia, migrating S. in winter, though it is unknown whither, returning about the end of April or the end of May. In appearance and habits it much resembles the yellow-hammer, but the head is greenish-gray. Ortolans are netted in great number, and fed in a darkened room with oats and other grain. In a short time they become exceedingly fat, and are then killed for the table.

Orton, James, an American clergyman, naturalist, and traveler; born in Seneca Falls, N. Y., April 21, 1830. In 1867, 1873, and 1876, he conducted exploring expeditions to South America. His works are "The Andes and the Amazon" (1870); "Underground Treasures" (1872); "Liberal Education of Women" (1873); "Comparative Zoölogy" (1875). He died on Lake Titicaca, Peru, Sept. 25, 1877.

Orton, Jason Rockwood, an American poet and miscellaneous writer; born in Hamilton, N. Y., in 1806; educated as a physician, but abandoned the practice of medicine in 1850, and devoted himself to literature. Besides contributions to periodicals, he published: "Poetical Sketches" (1829); "Arnold, and Other Poems" (1854); "Camp-Fires of the Red Men" (1855); "Confidential Experiences of a Spiritualist" (1858). He died in Brooklyn, N. Y., Feb. 13, 1867.

Ortyx, in ornithology, a genus of *Perdicinæ*; bill short, very high, the tip hooked; lateral toes, unequal; hinder toe, none, confined to America. *O. virginianus* is the Virginian quail.

Oruro, capital of the department of Oruro, in Bolivia; on a saline plain 11,960 feet above the sea, near the salt lake of Aullagas, and possesses mines of silver, gold, and tin. Founded in 1590, it had 70,000 inhabitants in the 17th century, but now has 15,200.

Orvieto, a city of Italy, province of Perugia; 78 miles N. N. W. of Rome; crowns an isolated tufa rock, which rises 765 feet above the river Pagalia, and 1,327 above sea-level. The cruciform cathedral (1290-1580), one of the most beautiful and richly adorned specimens of Italian Gothic,

is built of black and white marble, and measures 295 feet by 109. The façade is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, etc. The bishop's palace and St. Patrick's Well (1527-1540), with its 250 steps, are also noteworthy. Orvieto, called in the 7th century A. D. Urbs Vetus — of which its present name is a corruption — has by some been supposed to occupy the site of the Etruscan Volsinii. In the Middle Ages it gave shelter to 32 Popes.

Orycteropus, in zoölogy, the single genus of the family *Orycteropodidæ*. Body scantily covered with stiff hairs; no pollex to fore feet, hind feet with five subequal toes; mouth elongated and tubular, tongue subvermiform. Habits terrestrial and fossorial, feeding on animal substances, preferably ants. *O. capensis*, from South Africa, is the aard-vark of the Dutch colonists, sometimes called the cape anteater. *O. æthiopicus*, from Northeast Africa, is a second species, or well marked variety; *O. galensis* is doubtful.

Oryx, in zoölogy, a genus of *Bovidæ*; according to Sir Victor Brooke, typical of the sub-family *Oryginæ*. Four species are known: *O. leucoryx*, the Leucoryx, from Northeastern and Western Africa; *O. gazella*, the gemsbok, from Southern Africa; *O. beisa*, the beisa antelope, from Eastern Africa, and the coasts of the Red Sea; and *O. beatrix*, from Arabia.

Osage Orange (*Maclura aurantiaca*), a tree of the natural order *Moraceæ*, a native of North America. It attains a height varying, according to soil and situation, from 20 to 60 feet. It is of the same genus with fustic, and its wood, which is bright yellow, probably might be used for dyeing. The wood is fine grained and very elastic, and takes a high polish; it is much used for fence-posts, sleepers, paving-blocks, etc. The tree is largely employed in the United States, especially in the West, as a hedge plant; it has also been introduced into Great Britain for that purpose, but has not met with general appreciation. Its fruit is about the size of a large orange, has a tuberculated surface of a golden color, and is filled internally with radiating, somewhat woody fibres, and with a yellow milky juice, the odor of which is generally disliked, so that the fruit is seldom eaten.

Osages, a tribe of North American Indians, about 1,500 in number, living on a reservation in the N. part of the Indian Territory. It is said to be the richest community in the world. They own nearly 1,500,000 acres of land, worth not less than \$10 an acre. Besides this they have in

the United States Treasury nearly \$8,000,000, derived mainly from the sale of superfluous lands, drawing interest at the rate of 7 per cent. Each Osage Indian, man, woman and child, is worth at least \$15,000, and each family on a division would possess on an average \$60,000. The property is held and owned in common, and all their industries are nationalized.

Osaka, or **Ozaka**, an important city of Central Japan, at the head of the gulf of the same name, and at the mouth of the Yodo river, which issues from Lake Biwa. The city covers an area of about 8 square miles and is intersected with canals. Its fine castle, the stones of whose walls are of astonishing size, was constructed by Hideysohi's orders in 1583, and the palace, built afterward in its precincts and destroyed in 1868, was perhaps the most magnificent structure in Japan. Osaka is the great commercial center of the empire, and the headquarters of the rice and tea trade. Its port does not admit of the entrance of large vessels. There is a foreign settlement, mostly occupied by missionaries. Pop. (1908) 1,226,590.

Osbec. See WARBECK.

Osbon, Bradley S., an American naval officer; born in Rye, N. Y., Aug. 16, 1828; educated in New York and Connecticut; went to sea when 10 years old; served as coxswain in the Chinese navy, as commander in the Argentine, as admiral in the Mexican, and as signal officer in the United States navy during the Civil War, being especially mentioned by Admiral Farragut. During the American-Spanish War (1898) he was a volunteer naval scout, and was the first to discover Cervera's fleet off the island of Curaçoa, for reporting which he received a letter of thanks from the United States government. In 1900 he was flag officer commanding the United States Veteran Navy, with rank of commodore.

Osborn, Henry Stafford, an American educator; born in Philadelphia, Pa., Aug. 17, 1823; was graduated at the University of Pennsylvania in 1841, and at the Union Theological Seminary in 1846. He held several pastorates and made two trips abroad in 1846-1866; was Professor of Mining and Metallurgy in Lafayette College in 1866-1870; then held the same chair in Miami University till 1873, when he devoted himself to elaborating his surveys of noted places in Biblical history, and preparing a set of maps of the Holy Land that have become standards. Among his publications are: "Palestine, Past and Present" (1855); "Pilgrims in the Holy Land" (1857); "Scientific Metallurgy of Iron and Steel in the United States" (1870); "Ancient Egypt in the Light of Recent Discoveries" (1885); "Biblical History

and Geography" (1888); etc. He died in New York city, Feb. 2, 1894.

Osborn, Laughton, an American artist and author; born in New York city in 1809. He graduated at Columbia College in 1827. His works include: "Sixty Years of Life" (1831); "Vision of Rubeta" (1838); "Arthur Carryl" (1841); "Travels by Sea and Land" (1868). He died in New York city, Dec. 12, 1878.

Osborn, Sherard, a British Arctic navigator; born in Madras, April 25, 1882, the son of an English officer, entered the navy in 1837. He took part in the capture of Canton (1841), and of the defenses of Wosung (1842); commanded vessels in two expeditions sent out in 1849 and 1852-1855 respectively to search for Sir John Franklin; was head of the division of the British fleet that served in the Sea of Azov during the Crimean War; and took a leading share in the Chinese War of 1857-1859, penetrating up the Yang-tsze-kiang as far as Hankow. After his retirement from active duty he superintended the construction of a submarine telegraph between Great Britain and Australia, and was made rear-admiral in 1873. Besides publishing "Stray Leaves from an Arctic Journal" (1852); "Journals of Robert M'Clure" (1856); and "Career"; "Last Voyage"; and "Fate of Sir John Franklin" (1860), he proved his interest in Arctic exploration by inducing A. H. Markham to test the navigability of Baffin Bay in winter (1873) by steam power, and by helping to fit out the expedition which sailed under command of Nares, Markham, and others in 1875. He died May 6, 1875.

Osborn, Thomas Ogden, an American diplomatist; born in Jersey, O., in 1832; was graduated at the Ohio State University in 1854; read law with Gen. Lew Wallace, and began practice in Chicago, Ill., in 1859. He recruited and became colonel of the 39th Illinois Volunteers; was appointed to command four regiments in the attack on Fort Sumter; and was commissioned a Major-General of volunteers. After the war he resumed practice; was elected treasurer of Cook co., Ill., appointed a manager of the National Soldiers' Home; was a member of the commission to settle disputed claims between the United States and Mexico; and was minister to the Argentine Republic in 1873-1885. He died March 27, 1904.

Osborne (Samuel), Duffield, an American novelist; born on Long Island, N. Y., in 1858. His works are: "The Spell of Ashtaroth" (1888); "The Robe of Nessus" (1890), a historical novel, and "A Mountain Moloch."

Osborne Series, a series of beds of Oligocene age, found at or near Osborne, in the Isle of Wight. They were deposited in

fresh and brackish water. There are, of animals, peculiar species of *Paludina*, *Melania*, *Melanopsis*, and *Cypris*, and of plants, *Chara*. One bed is the Nettlestone Grit, near Ryde, which is a freestone much used for building. Called also the St. Helen's series.

Oscans, the name of an Italian people, who at an early period occupied Campania, and were either closely allied to or the same race as the Ausones. Subsequently (about 423 B. C.) Samnites from the hilly districts to the N. overran the country, and amalgamated with the inhabitants whom they had subjugated; and the names Osci and Oscan language were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder and more primitive form of the same central Italic tongue. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (88 B. C.), an end was put to the official use of the Oscan tongue.

Oscar I., Joseph François Bernadotte, King of Sweden and Norway, son of Bernadotte (Charles XIV.); born in Paris, France, July 4, 1799. In 1823 he married Joséphine, eldest daughter of Prince Eugène Beauharnais. During the reign of his father he was three times (in 1824, 1828, and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844; reformed the civil and military administration of the state; abolished primogeniture; established complete liberty of conscience; encouraged education and agriculture; promoted railways, telegraphs, etc. He took little part in foreign politics. He resigned in favor of his eldest son in 1857. He died July 8, 1859.

Oscar II., Frederick, King of Sweden, and till 1905 King of Norway; born in Stockholm, Jan. 21, 1829; third son of Oscar I. He ascended the throne in 1872, succeeding his brother, Charles XV. His reign was characterized by enlightened statesmanship, and he ruled with moderation and strict regard for constitutional principles. While steadfastly endeavoring to maintain the union of Sweden and Norway, he was liberal in his treatment of the discontented Norwegians, and though the dissolution in 1905 brought him heavy sorrow, he manfully bore it in the interest of peace. He was a scientist and a generous patron of science, as well as of art and industry, and much in sympathy with the spirit of modern progress. In his personal life he was simple and democratic. As a writer he produced some noteworthy works, among which are: "Contributions to the Military History of Sweden" (1859-65); "Charles XII." (1868); translations of Goethe's "Tasso" (1861) and Herder's "Cid" (1865); and

lyrical poems—including hymns—dramas, etc. In his closing days he enjoyed universal esteem as one of the world's most venerated sovereigns. He died in Stockholm, Dec. 8, 1907. See NORWAY; SWEDEN.

Osceola, a chief of the Seminole Indians; born in Florida about 1813; was the son of an Indian trader called Powell. In 1835, while on a visit to Fort King, his wife was claimed as a slave, as being the daughter of a fugitive slave woman, and carried off as such. Osceola resolved upon vengeance, and some months afterward, finding General Thompson outside of the fort, killed him and six other whites in his company, Dec. 28, 1835. Such was the beginning of the second Seminole War, during which Osceola defeated the United States troops in several engagements. On Oct. 23, 1837, while holding a conference under a flag of truce with General Jessup, near St. Augustine, he was treacherously seized and kept in confinement at Fort Moultrie till his death, in 1838.

Osci. See OSCANS.

Oscillation, the vibration of reciprocal ascent and descent of a pendulous body. The problem of oscillation, in its widest sense, includes most of those which occur in astronomy, optics, etc. To their average motions, the moon and planets add small oscillations about their mean places; the tides consist of oscillations of the ocean, about the uniform spheroid, which, if it were not for the action of the heavenly bodies, would be carried round in the daily rotation of the earth; the phenomena of light are supposed to result from oscillations in an elastic ether; those of sound from oscillations in the air, etc. In general language, however, the problem of oscillation refers only to the purely theoretical part of the problem of the pendulum.

Oscillation, Center of. See CENTER.

Oscott, a Roman Catholic college, near Birmingham, England, which claims to be the center of the Roman Catholic movement in England. The name is first met with toward the close of the 17th century as the seat of a Catholic mission, which continued to be served by different priests till in 1752 it was formed into a college for the education of both laymen and ecclesiastics, and called St. Mary's College. In 1835 the present fine buildings were erected, and in 1889 the establishment became purely ecclesiastical, no longer admitting lay students. It is now styled St. Mary's Seminary, and the curriculum includes a course of higher classics, science, and mathematics, to meet the requirements of the London University B. A. examination. After this the course consists of two years of mental philosophy and three and a half of theology and kindred subjects. The staff includes a

Osel

rector, vice-rector, and eight professors, and the seminary is open to students from any British diocese.

Osel. See OESEL.

Osgood, Francis Sargent (Locke), an American poet; born in Boston, June 18, 1811. Besides contributions to magazines she published: "Wreath of Wild Flowers" (1839); "Poetry of Flowers" (1841); "Poems" (1849). She died in Hingham, Mass., May 12, 1850.

Osgood, Samuel, an American clergyman and author; born in Charlestown, Mass., Aug. 30, 1812. He was the pastor of a Unitarian church in New York city from 1849 to 1869, when he resigned and joined the Episcopal Church. Besides translations from the German, his numerous works include: "Studies in Christian Biography" (1851); "Mile-Stones in our Life Journey" (1855); "Student Life" (1860). He died in New York city, April 14, 1880.

O'Shaughnessy, Arthur William Edgar, an English poet; born in 1844. In 1864 he entered the British Museum, and in 1873 married Eleanor, sister of Philip Bourke Marston. He was a follower of Morris and Swinburne and of the French romantic school. He published between 1870 and 1881: "An Epic of Women"; "Lays of France," a free paraphrase of the *lais* of Marie de France; "Music and Moonlight"; and "Songs of a Worker." He died in 1881.

Oshkosh, a city and county-seat of Winnebago co., Wis., on both sides of the Fox river, and on the Milwaukee, Lake Shore, and Western, the Chicago and Northwestern, and the Wisconsin Central, the Chicago, Milwaukee, and St. Paul railroads. Here are the court house, city hall, United States government building, public library, high school, School of the Deaf and Dumb, County Hospital for the Incurable Insane, the Northern State Hospital for the Insane, street railroad and electric light plants, waterworks, National and State banks, and several daily and weekly newspapers. The city contains about 450 manufacturing establishments, which employ about 6,000 persons. It has a large lumbering industry, manufactories of carriages and wagons, machinery, furniture, tobacco, and flour, and meat packing plants, and an assessed property valuation of over \$9,500,000. Pop. (1900) 28,284; (1910) 33,062.

Osiander, Andreas, a German reformer; born in Gunzenhausen, near Nuremberg, Dec. 19, 1498. His name is a Græcized form of the original German Heiligmann, or Hosemann. Educated at Ingolstadt, he declared himself an adherent of Luther, and became a preacher at Nuremberg (1522), persuaded that city to declare itself Lu-

Osiris

theran, took part in the conference at Marburg (1529), and was present at the diet of Augsburg (1530), and at the signing of the Schmalkald articles (1537). In 1548 he was deprived of his office as preacher because he refused to agree to the Augsburg Interim; but was immediately afterward invited by Albert, Duke of Prussia, to become Professor of Theology in the newly established University of Königsberg. He was hardly settled there when he became entangled in a theological strife that was greatly embittered by his vehement and arrogant temper. In a treatise, "Concerning Law and Religion," Osiander asserted that the righteousness by which sinners are justified is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz. Osiander's death in the midst of this fierce polemical war, Oct. 17, 1552, did not check it; the battle was continued by his followers, called Osiandrists, and led by his son-in-law Funk, who was executed for high treason in 1566, and the entire party was banished from Prussia in 1567. Osiander's son Lukas (1534-1604) and his grandson Lukas (1571-1638) won reputations as theologians.

Osier, in botany, *salix viminalis*, a willow with linear lanceolate acuminate leaves, reticulate above and silky beneath; golden yellow, sessile catkins opening before the leaves, etc., and tomentose capsules. Cultivated in osier beds, its long pliable shoots being used for wicker-work basket making. The purple osier is *S. purpurea*. It has purple-black scales, and is wild on river banks and cultivated in osier beds.

Osiris, in Egyptian mythology, one of the chief Egyptian divinities, the brother and husband of Isis, and, together with her, the greatest benefactor of Egypt, into which he introduced a knowledge of religion, laws and the arts and sciences. His principal office, as an Egyptian deity, was to judge the dead, and to rule over that kingdom into which the souls of the good were admitted to eternal felicity. He was that attribute of the deity which signified the divine goodness; and as an *avatar*, or manifestation of the divinity on earth, he was superior to any even of the Egyptian gods. He was styled Manifester of Good, President of the West, Lord of the East, Lord of Lords, Eternal Ruler, King of the Gods, etc. These, with many others, are commonly found in the hieroglyphic legends accompanying his figure; and the papyri frequently present a list of 49 names of Osiris in the funeral rituals. Osiris has been identified with many of the Grecian divinities; but more especially with Jupiter,

Oskaloosa

Pluto, and with Bacchus, on account of his reputed conquest of India. He was venerated under the form of the sacred bulls Apis and Mnevis; or as a human figure with a bull's head, distinguished by the name Apis-Osiris, and is usually represented as clad in pure white. His general attributes are the high cap of Upper Egypt, a flagellum, and sometimes a spotted skin. Under the form of the sacred bull Apis he was supposed to be always present among men.

Oskaloosa, a city and county-seat of Mahaska co., Ia.; between Des Moines and Keokuk rivers, and on the Chicago, Rock Island, and Pacific, the Burlington Route, and the Iowa Central railroads; 62 miles S. E. of Des Moines. It contains Oskaloosa College (Christian), Penn College (Friends), a business college, preparatory and normal schools, high school, public library, electric lights, National and State banks, and a number of daily and weekly newspapers. It is in a rich coal, iron, limestone, and fire clay region, and has manufactories of iron and brass goods, iron furnaces, vitrified brick works, woolen goods and flour mills, etc., and an assessed property valuation of over \$7,000,000. Pop. (1900) 9,212; (1910) 9,466.

Osman. See OTHMAN.

Osman Digna, a Sudanese slave merchant and lieutenant to the Mahdi; born in Suakin about 1830, of Turkish descent on his father's side. He proved himself one of the ablest leaders on the Mahdist side, defeating an Egyptian force under Baker Pasha in 1884 near the Red Sea coast of the Sudan. He was defeated soon after by a British force, and again in 1885. In 1897 he aided the Khalifa and his forces in opposing the Anglo-Egyptian expedition, and in January, 1900, he was defeated near Tokar and killed in battle.

Osmanieh, a Turkish order established by Abdul Aziz in 1861 for the reward of services rendered to the state. The chief decoration is a golden six pointed star enamelled in green.

Osman Pasha, a Turkish general; born in Tokat, Asiatic Turkey, in 1832; entered the Turkish army in 1853; fought with distinction in the Crimean War, the Syrian rebellion, and the Crete campaign, but his great achievement was the defense of Plevna during the Russo-Turkish War (1877). Afterward he held the office of war minister and several other high posts. In 1885 he was appointed grand marshal of the palace, and in 1897, Commander-in-Chief of the Turkish army in Thessaly. He died in Constantinople, Turkey, April 4, 1900.

Osmelite, called also pectolite, a white or grayish-white mineral which occurs in many localities in acicular monoclinic crys-

Osmunda

als, consisting of hydrated silicate of calcium and sodium.

Osmium, in chemistry, a tetrad metallic element, discovered by Tennant in 1804; symbol, Os; at. wt., 199.2; occurs combined with iridium, forming the native alloy osmiridium, in platinum ore. To obtain the metal, osmium tetroxide is digested with hydrochloric acid and metallic mercury, in a well closed vessel, at 140°, the osmium being reduced and an amalgam formed. On distilling the amalgam in an atmosphere of hydrogen gas, the mercury and calomel pass over, leaving metallic osmium as a black powder. Its properties vary according to the mode of preparation. In the pulverulent state it is black, destitute of metallic luster, and has a density of 7. By passing the vapor of the tetroxide, mixed with hydrogen, through a glass tube heated to redness, the metal is deposited as a compact metallic ring, density 10. When heated to the melting point of rhodium, it acquires a density of 21.4. It is the most infusible of all metals. In the finely divided state it is highly combustible, continuing to burn, when set on fire, till it is all volatilized. Osmium forms three chlorides: osmious chloride, OsCl_2 ; osmioso-osmic chloride, OsCl_3 ; and osmic chloride, OsCl_4 ; all produced by the action of chlorine gas on osmium. Five oxides are known: osmious oxide, OsO ; sesquioxide of osmium, Os_2O_3 ; osmic oxide, OsO_2 ; osmious anhydride, OsO_3 ; and osmic acid, OsO_4 . The first three form salts with acids, the fourth is a weak acid, and the fifth is usually regarded as an acid, but its salts are very unstable.

Osmose, in chemistry, osmosis, the mixing of dissimilar substances through a porous diaphragm—a phenomenon due to the attraction which the liquids have for each other. When liquids or gases are separated by a membrane, such as a bladder, it is generally found that the quantities passing in opposite directions are unequal. In the case of water and alcohol the water passes into the alcohol, but only a small quantity of alcohol is found in the water. When a colloidal substance is on one side of the diaphragm and water on the other, the latter only passes through.

Osmunda, in botany, fern royal, osmund royal, or flowering fern; the typical genus of *Osmundea*. Six are known. One, *O. regalis*, the common osmund royal, or flowering fern, is the noblest of our domestic ferns; the fronds are bipinnate, fertile at the top. One was found by Stewart Murray 11½ feet high. It is frequent in boggy places and the wet morasses of woods in the W. of Scotland and the S. of Ireland. Found also in England, Continental Europe, Asia, and Canada. The powdered stem has been used successfully in rick-

Osnabrück

ets, the dose being three drachms. Sometimes this fern has been called bog onion.

Osnabrück, a town of Prussia; province of Hanover, in the valley of the Hase, 75 miles S. S. W. of Bremen. Its great Catholic cathedral, in the Transition style of the first half of the 13th century, is rich in relics and monuments; and the town hall (1486-1512) contains portraits of all the plenipotentiaries who here, Oct. 24, 1648, signed the peace of Westphalia. By that treaty the bishopric of Osnabrück, founded by Charlemagne about 810, was to be occupied alternately by a Catholic prelate and a Protestant secular prince of the House of Brunswick-Lüneburg. After having last been held by Frederick, Duke of York, the district of Osnabrück came in 1802 to Hanover, and the chapter was dissolved, till the reestablishment of the bish-



OSPREY.

opric in 1857. Osnabrück has important iron and steel works, and manufactures of railway plants, agricultural machinery, gas-meters, paper, tobacco, etc. Dating from 772, it suffered much in the Thirty Years' War, but recovered, thanks to its linen industry, during the 18th century. The name Osnaburgs given to coarse linens is derived hence. Pop. (1905) 59,580.

Osprey, or **Ospray**, in ornithology, *Pandion haliaëtus*, the fish hawk, bald buzzard, or fishing eagle. A bird of prey, of almost

Ossification

world wide distribution, subsisting on fish. The osprey is about two feet long, with a wing expanse nearly three times as great. The plumage is dark brown, white on the under surface, with a few streaks of brown on the throat; crown light brown edged with white, and a streak of dark brown from the eye to the shoulders. Ospreys nest usually near the seashore, and, unlike rapacious birds generally, are in some measure gregarious. In North America large communities of ospreys are found, and the purple grackle often builds close by. The osprey lays three or four eggs of a rich red to buffy white, with large reddish and brown markings.

Ossa, the ancient name of a mountain on the E. side of Thessaly, near Pelion, and separated from Olympus by the vale of Tempe. The ancients placed the seat of the Centaurs and Giants in the neighborhood of Pelion and Ossa.

Ossetes, one of the numerous tribes or peoples inhabiting the Caucasus, belonging to the Indo-European or Aryan family, and to the Iranic branch of it. They are at a lower stage of civilization than some of the neighboring peoples. Their religion consists of a strange mixture of Christianity, Mohammedanism, and paganism. They number about 110,000.

Ossian, a mythical Gaelic hero and bard, is said to have lived in the 3d century, and to have been the son of Fingal, a Caledonian hero, whom he accompanied in various military expeditions. His name has derived its celebrity from the publications of Macpherson, who, about 1760, gave to the world, as the "Poems of Ossian," a remarkable series of ballads, on the deliverance of Erin from the haughty Swaran, King of Lochlin, by Fingal. They have been translated into all the European languages, and please by their delineation of the scenery of the Highlands, picturesque expressions, bold but lovely images and comparisons, and tender, melancholy tone.

Ossification, the formation of bone. In the growth of the skeleton of man and the higher animals, this process goes on naturally, and it occurs in the reproduction of new bones after the destruction or loss of old ones. Ossification also occurs as an unnatural or morbid process, and is observed in several tissues of the body. It occurs most frequently in the cartilage of the ribs, where the process is almost constantly going on in advancing years. Bone begins to form in the cartilages of the ribs after the 50th year; but in some cases it commences between the ages of 30 and 40. The cartilages of the windpipe are next to those of the ribs in their liability to become osseous. Ossification of the movable joints never occurs. The disease called "ossifica-

Ossining

tion of the heart" is not an affection of the proper substance of that organ, but of its valves, in which earthy matter is sometimes deposited; thus rendering them stiff and unyielding. This substance is composed of carbonate and phosphate of lime, as bone is; but its particles have no definite arrangement.

Ossining, a village in Westchester co., N. Y., on the Hudson river, and on the New York Central and Hudson River railroad; 30 miles N. of New York. It is situated at the widest part of the river on ground rising to an altitude of 300 feet, and commands a fine view of many interesting points on the river. Here are St. John's School, Mount Pleasant and Holbrook Military Academies, street railroad and electric light plants, a portion of the Croton aqueduct, which is carried across Kill brook by a stone arch 88 feet wide and 70 feet high; National and savings banks, and several weekly newspapers. It has manufactories of lime, pills, porous plasters, sleighs, carriages, cotton gins, steam engines, gas and water pipe, etc., an assessed property valuation of about \$10,500,000. A State penitentiary, one of the most famous of American prisons, is located here. On this account, after many attempts to have its former name, Sing Sing, changed, the Legislature in 1901 granted this privilege to the residents, and the name Ossining was adopted. Pop. (1900) 7,939; (1910) 11,480.

Ossining, a town in Westchester co., N. Y., containing the village of SING SING (*q. v.*).

Ossoli, Marchioness d', Sarah Margaret Fuller, best known as MARGARET FULLER, an American writer on literature,



MARCHIONESS D'OSSOLI.

art, and society; born in Cambridgeport, Mass., May 23, 1810. For some years she was employed as a teacher in girls' schools; for two years edited the "Dial" (1840 - 1842). Her collected essays on "Women in the Nineteenth Century" were published in 1843. She contributed regularly to the New York

"Tribune" papers on literature and art, which were collected in a volume published in 1846. At Rome in the same year she married the Marquis d'Ossoli. The pair

Ostend Manifesto

were on their way to New York when their ship was wrecked and both were lost. Besides the volumes already named, she published other collections of her essays under the titles: "Art, Literature, and Drama"; "At Home and Abroad"; "Life Without and Life Within." She died July 19, 1850.

Ostade, Adrian Van, a painter of the Flemish school; born in Lübeck in 1610. His pictures are characterized by an exact imitation of nature, and usually consist of ale house interiors, with Dutch peasants smoking, quarrelling, or drinking. His coloring is rich and clear, his touch spirited and free, and all his works are highly finished. He died in 1685.

Ostade, Isaac Van, brother of the preceding; born in Lübeck in 1612. He was taught by Adrian, painted the same class of subjects, and with no less ability. Some of his best pieces are in the Louvre. He died in 1671.

Ostend, a fashionable watering place in the Belgian province of West Flanders, on the German Ocean, 77 miles W. N. W. of Brussels. Its *digue*, or sea wall, 3 miles long, 40 feet high, and 35 yards broad, forms a favorite promenade, as also do the two *estacades*, or wooden piers, projecting on both sides of the harbor's entrance. Two spacious floating basins for the Dover mail-packets were completed in 1874; and as a station also for London steamers, and the terminus of various lines of railway, Ostend is a lively and active place of transport traffic (butter, rabbits, oysters, etc.), and the resort in the season (July to September) of 16,000 to 20,000 visitors from Germany, Russia, and all parts of the Continent. It is, moreover, an important fishing station, and has a good school of navigation, a handsome Cursaal (1878), a city hall (1711), a fish market, and a lighthouse (1771; 175 feet). The manufactures include linen, sail cloth, candles, and tobacco. Dating from 1072, Ostend is memorable for the protracted siege by the Spaniards which it underwent from July 7, 1601, to Sept. 20, 1604. Twice again it surrendered—to the Allies in 1706, and to the French in 1745. The fortifications have been demolished since 1865. Pop. (1906) 41,698.

Ostend Manifesto, The, in United States history, a dispatch forwarded to the United States government in 1854 by its ministers at the courts of Great Britain, France, and Spain, who had met in the city of Ostend, by the government's request, to discuss the Cuban question. The dispatch declared that, if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanized like Haiti. Nothing, however, came of the "manifesto."

Osteolepis

Osteolepis, a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is characterized by smooth rhomboidal scales, by numerous sharply pointed teeth, and by having the two dorsal and anal fins alternating with each other. The body is long and slender.

Osteology, a discourse or treatise on the bones; that branch of anatomy which describes the bones and their uses. See ANATOMY: BONE.

Osteopathy, a system of healing, founded by Dr. A. T. Still. In spite of the apparent etymology of the name, the system does not confine itself to the treatment of bone diseases, but claims to be a general system founded on the principle that "all bodily disorders are the result of mechanical obstruction to the free circulation of vital fluids and forces." As stated in official publications, "osteopathy has nothing in common with the faith cure, Christian Science, spiritualism, hypnotism, magnetic healing, Swedish movement, mental science, or massage. There is nothing supernatural about it. Its apparently marvelous cures are accomplished through purely scientific methods, based on a profound knowledge of the human mechanism. The diagnosis is largely through the sense of touch, which is developed to its highest perfection. As the fingers of the blind are trained to read the letters of the alphabet through several thicknesses of cloth, so the fingers of the osteopath, passed over the surface of the body, seldom fail to detect the slightest disarrangement of the human mechanism. He not only knows how the body looks when the anatomy is normal, but also how it feels." The osteopath takes the position that when all obstructions to the proper direction of the life giving and healing energies that are resident in the body—such as maladjustments or abnormalities of the bodily machine in any of its parts—are detected and corrected, by a thorough knowledge of anatomy and physiology, nature fast regains her equilibrium of health and strength. No medicine whatever is used and no surgery employed, except in cases where the latter is needed exclusively. The remarkable cures effected by this treatment and its growing popularity have caused the legislature of a number of States to legally recognize osteopathy as a science as worthy of acceptance as allopathy, homeopathy, or surgery. In 1892 Dr. Still organized a college at Kirksville, Mo., under the laws of that State. A large building was erected in 1895 and additions made in 1896. The school began with 28 students and has steadily increased in numbers. In 1899 it had between 300 and 400 students.

Osterhaus, Peter Joseph, an American military officer; born in Coblenz, Germany,

Ostracism

about 1820; emigrated to the United States, and was made a major of Missouri volunteers early in the Civil War; commanded a brigade under Fremont, and a division in the battle of Missionary Ridge. He was promoted to Major-General of volunteers in 1864. After the war he was appointed United States consul at Lyons, France, and finally returned to Germany.

Osterode, a town of Hanover, Prussia, at the W. base of the Harz Mountains, on the Söse, an affluent of the Leine, 30 miles N. W. of Nordhausen. Its church of St. Giles (724; rebuilt 1578) contains the graves of the dukes of Grubenhagen, and there are also a fine town hall, baths, large grain stores, and cotton, woolen, and linen factories. **OSTERODE**, in East Prussia, on the Drewenz, 77 miles N. E. of Thorn, has a castle of the Teutonic knights (1270) and iron manufactures.

Ostia, an ancient city of Italy, at the mouth of the Tiber, 6 miles from Rome by the "Way of Ostia." It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea. The port, however, was never good, and owing to the gradual accumulation of the mud and other deposits brought down by the river it ultimately became inaccessible to ships of large tonnage. Many efforts were made by various Roman emperors to improve the port, but without much success. It was destroyed by the Saracens in the 9th century. Its ruins comprise tombs, two temples, a theater, etc. The modern Ostia (founded by Gregory IV. in 830) is a miserable village with but few inhabitants.

Ostiaks, or **Ostyaks**, a Ural-Altaic people living along the lower course of the river Ob in Western Siberia, where they struggle against chronic poverty, drunkenness, frequently famine, to get a living by fishing and hunting fur-bearing animals. They dwell in wretched and very dirty huts, eat flesh raw, use bows and arrows, and weapons of bone and stone; and are still in great part heathens. They are decreasing in numbers, and are estimated now at 27,000. Their language belongs to the Finnish division.

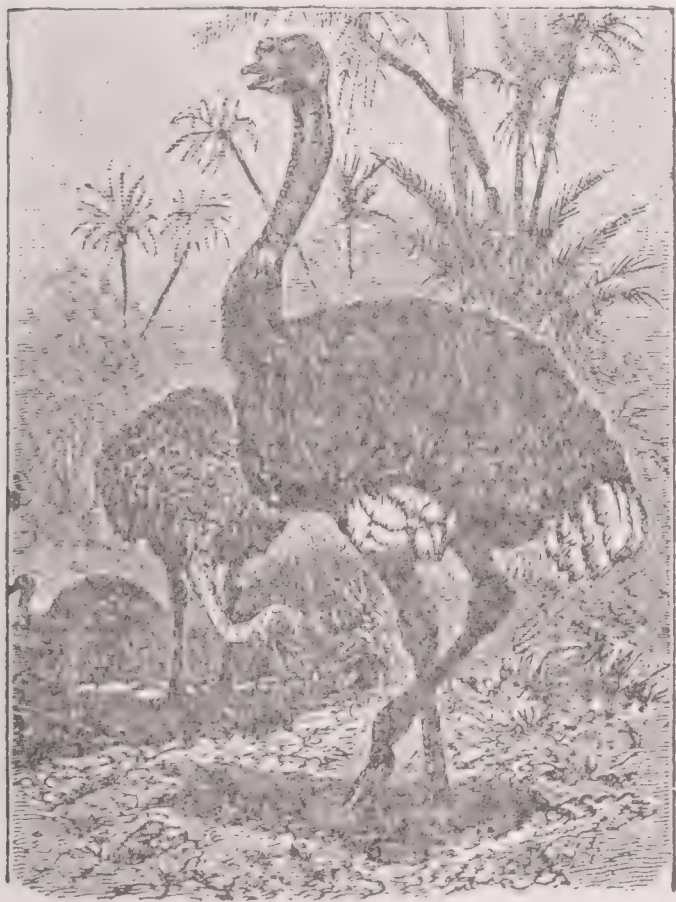
Ostracion, in ichthyology, coffer fish; the sole genus of the group Ostraciontina. The carapaces of some species are three, of others four and five-ridged, and some are provided with long spines. Twenty-two species are known from tropical and subtropical seas. Lütken considers *O. boops* to be the young of a sunfish. Called also trunk fish. In palæontology, one species from the Tertiary of Monte Bolca.

Ostracism, a practice introduced into Athens by Kleisthenes to preserve the democratic government which he had established,

and which sooner or later existed also in Argos, Megara, Miletus, and Syracuse. If any citizen became so powerful that it was feared he would attempt to overthrow the government, an ostracism was asked from the Athenian senate and the public assembly. If granted, the citizens each deposited a shell or potsherd on which was written the name of any person of whom they entertained apprehension, and if 6,000 concurred in voting against the same individual, he was required to go into honorable banishment for 10 years, retaining, however, all his property.

Ostrogoths, the E. branch of the Gothic race that, in a very early day, lived in Southern Russia near the Valley of the Don. Here in A. D. 375 they were attacked and conquered by the Huns. In 378 many of them settled in Pannonia. Theodoric became their king in 474, and in 479 led them over the Julian Alps, conquered Odoacer in 493 and became King of Italy. The country prospered under his reign. Belisarius endeavored to expel these people and in 552 the kingdom was taken from them and they gradually became incorporated with other nations.

Ostrich, in ornithology, *Struthio camelus*, from the deserts of Africa and Arabia. It is the largest of all living birds,



OSTRICH.

standing from six to eight feet in height, and has been known from remote antiquity; Xenophon mentions it in the "Anabasis" (i: 5), as found in the plains of Artemisia, and there are frequent references to it in later Roman literature. Heliogabalus is

said to have had a dish served up composed of the brains of 600 ostriches. Hunters report that the flesh is palatable. The ostrich is hunted and bred for the sake of the quill feathers of the wings and tail, now used by ladies, though formerly ostrich plumes decked the helmets of knights, still later, the hats of the cavaliers, and the fashion came in again for a time at the Restoration. The ostrich is a vegetable feeder, but swallows stones, bits of iron, and other hard substances to aid the gizzard in its functions. On ostrich farms newly hatched birds have been observed to pick up little stones before taking any food. The head and neck are nearly naked, body black, quill feathers of wings and tail white. The wings are useless for flight, but of so much assistance in running that the bird can outstrip the fleetest horse. Ostriches are polygamous, the hens lay their eggs in a common nest—a hole scratched in the sand, and the cockbird relieves the hens in the task of incubation, which is aided by the heat of the sun.

Ostrich Farming, the raising of ostriches for their feathers as a commercial commodity. The most extensive and remunerative ostrich farms are in South Africa, where the business was established in 1867, though it is carried on to some extent in Algeria, Egypt, Australia, South America and Southern California. It was very profitable in the early part of its history, as the feathers then brought \$500 a pound, one bird sometimes producing \$125 worth at a plucking. Many ostrich farms are devoted solely to raising the birds for sale, others are for the purpose of producing the feathers. The first feathers are cut when the bird is about eight months old, and a portion of the quill is left, which soon shrivels up and is easily drawn out. This process of feather cutting is renewed at intervals of seven or eight months, the bird reaching its prime at three years. Some years ago a pair of adult birds readily sold for \$2,000 or \$2,500, and a "chick" for \$50, but these prices have greatly decreased and now range from \$100 upward per pair. The most valuable ostrich feathers are the long white plumes from the ends of the wings of the male bird, there being from 10 to 20 of them in each wing. The plumes of the female are not pure white, being flecked with gray. The feathers are sold by weight, 120 to 130 of the finest going to a pound. The ostrich seems to prefer an alkaline soil on which to graze, and its introduction into Southern California in 1882 has proven quite successful.

Ostrovsky, Alexander Nikolaievich, a Russian dramatist; born in Moscow, Russia, April 12, 1823. One of his best comedies, "We Get On with our Own Kind," published in 1849, established his reputation. His works followed each other in

rapid succession. Among the best are: "The Poor Bride" (1852); "Poverty is Not a Fault" (1853); "A Profitable Place" (1857); "The Storm" (1859); and "A Warm Heart" (1869). He was the author of several translations, especially a remarkable one of "The Taming of the Shrew." His complete works were published in St. Petersburg (1887). He died June 14, 1886.

Oswald, St., king of Northumbria, son of the conquering Ethelfrith of Bernicia and of Acha, sister of the brave Edwin of Deira. He fought his way to the throne by the defeat, at Heavenfield near Hexham (635), of Cædwalla, the Welsh king, who had aided Penda to crush Edwin at Hatfield two years before. Under the reign of Edwin he had found shelter in Scotland, and been converted to Christianity at Hii or Iona; and now, when he was hailed king of the whole of Northumberland, he established Christianity with the help of St. Aidan, who settled on Holy Island. Oswald was acknowledged as overlord by all the kingdoms save those subject to Penda. He fell fighting against his enemy at Maserfield (Oswestry) in 642.

Oswald, Felix Leopold, an American naturalist; born in Namur, Belgium, Dec. 6, 1845; graduated at Liège in 1864, and became a physician; but later abandoned the practise of medicine, and devoted himself to the study of natural history. His works include: "Summer-Land Sketches" (1880); "Physical Education" (1882); "The Secret of the East; or, The Origin of the Christian Religion" (1883); "Days and Nights in the Tropics" (1887); "The Bible of Nature. He died in 1906.

Oswegatchie, Fort, an old French fort, built on the site of the present city of Ogdensburg, N. Y., about 1735, and called Fort Preservation, and Fort La Gallette. In 1760 it was taken by the British and called Fort William Augustus.

Oswego, a city and county-seat of Oswego co., N. Y.; on the Oswego river, the Oswego canal, and the New York, Ontario, and Western, the Lackawanna, and the Rome, Watertown, and Ogdensburg railroads; 36 miles N. of Syracuse. The city has two harbors, one at the immediate mouth of the river and one in Lake Ontario. It contains a State Normal School, United States Government Building, Gerritt Smith Library, orphan asylum, public hospital, Old Ladies' Home, St. Francis' Home for Orphans, high school, electric light and street railroad plants, National and savings banks, and several daily and weekly newspapers. There are manufactories of boilers and engines, etc., shade cloth, hosiery, matches, starch, etc., and an assessed property valuation of nearly \$10,500,000. Os-

wego has regular steamboat communication with the cities of the Great Lakes; annual imports about \$800,000, and exports, \$2,000,000. Pop. (1890) 21,842; (1900) 22,199; (1910) 23,368.

Oswego, Fort, an old French fort, built on the site of the present city of Oswego, N. Y., by Count Frontenac, about 1696. Fort Ontario, however, was built on the opposite side of the Oswego river in 1755, and at once took the precedence. Both forts were the scenes of considerable fighting during the French and Revolutionary Wars, and once in 1814.

Oswego River, a river in New York formed by the junction of the Seneca and Oneida rivers 12 miles N. W. of Syracuse. It is 24 miles long.

Oswego Tea, a name given to several species of *Monarda*, particularly *M. purpurea*, *M. didyma*, and *M. kalmiana*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. They belong to the natural order *Labiatae*, somewhat resemble mints in appearance, and have an agreeable odor. The infusion is said to be useful in intermittents and as a stomachic. Some other species of *Monarda* are used in the same way, and the three species named are not uncommonly cultivated in gardens for ornament.

Oswestry, a thriving market town and municipal borough of Shropshire, England, 18 miles N. W. of Shrewsbury. It has an old parish church, restored in 1872; a fragment of the Norman castle of Walter Fitzalan, progenitor of the royal Stewarts; and a 15th century grammar school, rebuilt in 1810, and enlarged in 1863-1878. Railway workshops were established in 1865, and sewerage and waterworks constructed in 1866. Oswestry derives its name from St. Oswald, who was slain here. In 1644 it was captured by the Parliamentarians.

Osymandyas, the name of a great King of Egypt, mentioned by Diodorus and Strabo, who reigned, according to these authors, as the 27th successor of Sesostris. He is said to have distinguished himself by his victories, to have invaded Asia with an army of 400,000 men and 20,000 cavalry, and to have conquered the Bactrians, who had been rendered tributary to Egypt by Sesostris. In honor of this exploit he is said by Hecataeus to have erected a monument which was at once a palace and a tomb, and which, under the name of Osymandeion, was renowned for its size and splendor in later times. The Osymandeion is generally believed to be represented by the extant ruins of the Ramesseum at Medinet Habu, though great difficulty has been felt in reconciling the descriptions of

its magnificence in ancient writers with the dimensions of the existing relic. Nor can the name of Osymandyas be recognized among the Egyptian kings.

Otago, one of the provincial districts of New Zealand, including the whole of the S. part of South Island, S. of the districts of Canterbury and Westland, being surrounded on the other three sides by the sea; area, about 15,000,000 acres. The interior is mountainous; many peaks attain the height of from 3,000 to 9,000 feet, but there is much pastoral land; the N. E. consists of extensive plains. Otago, though it possesses valuable gold fields, is chiefly a pastoral and agricultural district, second only to Canterbury in wheat production. The climate is similar to that of Great Britain, but warmer and more equable. The largest river is the Clutha or Clyde, the largest of New Zealand. There are also extensive lakes, as the Te Anau, 132 square miles; the Wakatipu, 112 square miles in area. Coal has been found in abundance. Otago was founded in 1848 by the Scotch Free Church Association; it is now the most populous division of the colony. The capital is Dunedin; the next town in importance is Oamaru. Pop. (1906) 180,974.

Otalgia, neuralgia of the ear. It occurs in fits of excruciating pain, shooting over the head and face, but it is not accompanied by fever, nor usually by any sensation of throbbing. Its causes and treatment are those of neuralgia generally, but it is particularly caused by caries of the teeth, which should always be carefully examined by a dentist in these cases. A drop or two of laudanum, with the same of sweet oil, dropped into the painful ear will often give temporary relief.

Otchakoff, a seaport of Russia, on the N. shore of the estuary of the Dnieper, 38 miles E. N. E. of Odessa. It occupies the site of the ancient Alector, and has beside it the ruins of the once important Greek colony of Olbia. In 1492 the Khan of the Crimea built here a strong fortress, which was taken by the Russians under Münnich in 1737, recovered in 1738, and again captured after a long siege by Potemkin in 1788, and definitively annexed by Russia. After it had been bombarded by the allied fleet in 1855 the Russians demolished the fortifications. In 1887 a ship canal was opened here, which makes the estuary of the Bug and Dnieper much more easily accessible to large ships.

Otero, Rafael, a Cuban dramatist; born in Havana, in 1827. Among his comedies are: "Betrothed of a Day"; "The Coburger"; "My Son the Frenchman"; and "The Dead Commands It," which were presented in the theaters of Havana and

Matanzas. His novel "The Pearl of the Diana" was published in 1866, and "Social Songs" in 1868. He died in Havana, in 1876.

Otfried, a Frankish poet; born near Weissenburg, in Alsace; studied at Fulda under Hrabanus Maurus (822-884), and also under Salomon I., Bishop of Constance (839-871); then went back to the Benedictine monastery in Weissenburg, where he wrote his famous paraphrase in verse of the Gospels, dedicated about 865 to (King) Louis the German, and to Archbishop Luitbert of Mentz. It is one of the most valuable documents of the Old High German period.

Othman, or **Osman**, founder of the Ottoman empire; born in 1259; one of the emirs who, on the destruction of the empire of the Seljukides, became independent chiefs. Joined by other emirs, he invaded the Eastern Empire in 1299, and made himself master of Nicæa, Iconium, and other towns. He took no other title than Emir, but ruled with absolute power, not without justice and moderation. He died at a great age, in 1326. A second of the same name, was the 16th Ottoman Sultan, reigned 1613-1622, and was strangled. A third, who was the 25th Sultan, reigned 1754-1774.

Othman, Ibn-affan, son-in-law of Mohammed; born about 574; succeeded to Omar as 3d caliph, 644. He was murdered by Mohammed, son of Abu-bekr, 656.

Otho I., Emperor of Germany, called THE GREAT; born in 923; was the eldest son of Henry the Fowler, and crowned King of Germany in 936, at the age of 14. He carried on war with the Huns, and drove them from the West; made Bohemia his tributary; deprived the Duke of Bavaria of his estates, and then had to encounter the resistance of the great chieftains of the empire, aided by the King of France. He afterward aided the same king against his revolted vassal, Hugh the Great, defeated the Danes, and again invaded Bohemia. He was then engaged for 10 years in war with the Hungarians, and finally defeated them at Leck. Berenger having usurped the title of Emperor of Italy, Otho entered Rome, where he was crowned Emperor by John XII. That pontiff afterward leagued with Berenger, on which Otho caused him to be deposed, and put Leo VIII. in his place, in 963. On the emperor's return to Germany, the Romans revolted and imprisoned Leo; for which Otho again visited Rome, which he besieged and restored Leo. He next turned his arms against Nicephorus, Emperor of the East, whose army he defeated. John Zimisces, the successor of

Otho II.

Nicephorus, made peace with Otho, who died in 973.



OTHO I. AND EDITH.

Otho II., surnamed the BLOODY; born in 951, succeeded Otho I., his father, in 973. His mother, Adelaide, opposed his accession, her party proclaiming Henry, the Duke of Bavaria, emperor. Otho expelled his mother from the court, defeated Henry, repulsed the Danes and Bohemians, and afterward marched into Italy to expel the Saracens, but he fell ill at Rome, where he died in 983.

Otho III.; born in 980; succeeded Otho II., his father, in 983. The empire was administered during his minority by his grandmother Adelaide, conjointly with the Archbishop of Cologne. At the age of 16 he assumed the reins of government, and went to Italy, which was in a state of confusion, owing to the opposition of different Popes. Otho having reestablished order, returned into Germany, and made Boleslas King of Poland. He was obliged again to pass into Italy to quell a revolt, but died soon afterward, in 1002.

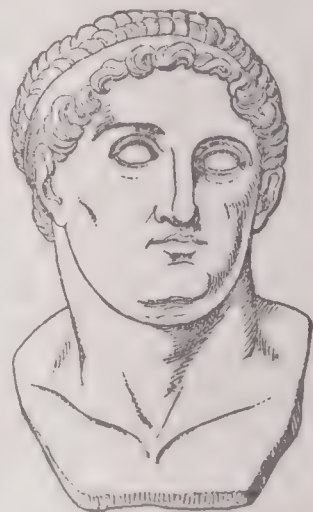
Otho IV., called the SUPERB, was the son of Henry, Duke of Saxony, and chosen emperor in 1208. He was excommunicated by the Pope for seizing the lands which the Countess Matilda bequeathed to the Holy See. In 1212 the princes of the empire elected Frederic King of Sicily, in the room of Otho, who, after struggling against his rival till 1215, resigned his crown to him, and retired to Brunswick. He died in 1240.

Otho, King of Greece, 2d son of Louis I., King of Bavaria; born in Salzburg, July

Otis

1, 1815. At 17 years of age he was invited by the Greeks to become their monarch, and this proposition being acceded to by the governments of Great Britain, France, and Russia, in a treaty concluded in London in May, 1832, Otho was accordingly declared King of Greece in January, 1833, and, in June, 1835, on his attaining the age of 20, he assumed the reins of government. Otho, however, soon became unpopular with his subjects, owing to his selection of Bavarians as his cabinet advisers, and, also, to the strong pro-German sympathies he continually manifested. After a stormy and inglorious reign of 30 years, Otho abdicated the throne, Oct. 20, 1862, and fled the country, which was then in a state of insurrection against the royal authority. He died in Bamberg, Bavaria, July 26, 1867.

Otho, Marcius Salvius, a Roman emperor; born in Rome, A. D. 32. After Nero's death, he attached himself to Galba, but that emperor having adopted Piso as his heir, Otho excited an insurrection, murdered Galba and Piso, and ascended the throne in 69. He was opposed by Vitellius, who was supported by the German army, and in a battle between the two rivals near Bedriacum, Otho was defeated, on which he slew himself, after reigning three months.



OTHO OF ROME.

Otididæ, in ornithology, bustards; a family intermediate between the game birds and the plovers. The bill is always short, the wings convex, tail short, and hind toe wanting. Chief genera: *Otis*, *Edicnemus*, and *Cursorius*.

Otis, Elisha Graves, an American inventor; born in Halifax, Vt., Aug. 3, 1811; best known for his invention of a hoisting machine with special automatic features to prevent the loss of life in case the lifting-cable should break. He died in Yonkers, N. Y., April 8, 1861.

Otis, Elwell Stephen, an American military officer; born in Frederick, Md., March 25, 1838; was graduated at Rochester (N. Y.) University in 1858, and began the study of law. He was just entering on practice when the Civil War broke out, and in September, 1862, he entered the volunteer service as captain in the 140th New York Infantry. He took an active part in the battle of Gettysburg, where his regiment lost 133 men in killed and wounded. At the

battle of the Wilderness, he commanded as lieutenant-colonel the picket line of the 5th Corps, which brought on the engagement. In this battle the 140th lost 255 men, only three of the captains being left. At Spottsylvania the regiment lost its colonel and Otis succeeded to the command. He was severely wounded near Petersburg, Oct. 1, 1864, and was disabled for duty. He was discharged from the volunteer service Jan. 24, 1865, with the brevet rank of Brigadier-General. In 1866 he was appointed lieutenant-colonel of the 22d United States Infantry, and became colonel of the 20th Infantry in 1880. From 1867 to 1881 he served with the army in the West against the Indians. In 1881 he organized the School of Infantry and Cavalry at Fort Leavenworth, Kan., of which he remained in command till 1885. He then went with his regiment, the 20th Infantry, to Fort Assiniboine, Mont., where he was commander of the post. On Oct. 1, 1890, he was detailed for duty as superintendent of the recruiting service, and Nov. 28, 1893, was promoted to the full rank of Brigadier-General. On Dec. 1 of the same year he was assigned to the command of the Department of the Columbia, with headquarters at Vancouver, and in 1897 was transferred to the Department of Colorado. On May 28, 1898, he was appointed Major-General of volunteers and assigned to duty in command of the Department of the Pacific, and as military governor of the Philippines, which office he held till May 5, 1900. He was a member of the Philippine commission, and on June 16, 1900, was promoted Major-General, U. S. A., and on Oct. 25 was assigned to the Department of the Lakes. He died Oct. 21, 1909.

Otis, Harrison Gray, an American statesman, son of James; born in Boston, Mass., Oct. 8, 1765; was member of Congress, 1797-1801, and United States Senator, 1817-1822. He was prominent in the Massachusetts Legislature; took an active part in the Hartford Convention of 1814; and was mayor of Boston in 1829. His published works include: "Letters in Defense of the Hartford Convention" (1824), and "Orations and Addresses." He died in Boston, Oct. 28, 1848.

Otis, James, an American statesman; born in West Barnstable, Mass., Feb. 5, 1725. At an early age he attracted attention by his eloquence in behalf of the colonists against British oppression, and his determined opposition to the "writs of assistance" in 1761. Through his efforts the Stamp Act Congress was assembled in 1765. He was the author of a number of political essays and orations, among which are "Vindication of the Conduct of the House of Representatives" (1762); "Rights of the British Colonies Asserted" (1765); "Con-

sideration on Behalf of the Colonists" (1765). He died in Andover, Mass., May 23, 1783.

Otitis, in pathology, inflammation of the ear; earache. It is attended by severe pain. In the worst cases it ends in otorrhœa. Called also otalgia.

Otomis, a tribe of Mexican Indians, and one of the oldest nations in the mountainous regions of the plateau. They were agriculturists and had some knowledge of the manufacture of cloth and ornaments of gold and copper. During the siege of Mexico they came to the assistance of Cortez (in 1521), and have ever since been nominally in subjection to the whites. They accepted the Catholic faith, but have made little progress in civilization. Their descendants are scattered throughout Central Mexico and number some 200,000.

Otranto (the ancient Hydruntum), a town in the extreme S. E. of Italy, 29 miles S. E. of Lecce, and on the Strait of Otranto, 45 miles from the coast of Albania on the opposite side. During the later period of the Roman empire, and all through the Middle Ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece—having in this respect supplanted the famous Brundisium of earlier times; but its port is now in decay. In 1480 it was taken by the Turks. At the present day its castle, which gives the title of Horace Walpole's well-known story, is in the same condition as its port. The town is the seat of an archbishop, and has a cathedral, restored after the siege by the Turks, with fine mosaics and an ancient crypt. In the province of Lecce (formerly called Terra di Otranto) many Albanians have long been settled.

Ottavarima, a form of versification consisting of eight lines, of which the first six rhyme alternately, and the last two form a couplet, the meter of the lines being 11 syllables.

Ottawa, one of the largest rivers of British North America, rises nearly 300 miles due N. of Ottawa city, flows W. to Lake Temiscamingue, some 300 miles, and thence 400 miles S. E., and falls into the St. Lawrence by two mouths, which form the island of Montreal. Its drainage basin has an area variously estimated at from 60,000 to 80,000 square miles. During its course it sometimes contracts to 40 or 50 yards; elsewhere it widens into numerous lakes of considerable size. It is fed by many important tributaries, the chief of which are the Petewawa, Bonnechère, Madawaska, and Rideau on the right, and the Coulouge, Gatineau, and Rivières du Lièvre and du Nord on the left side. These, with the Ottawa itself, form the means of transit for

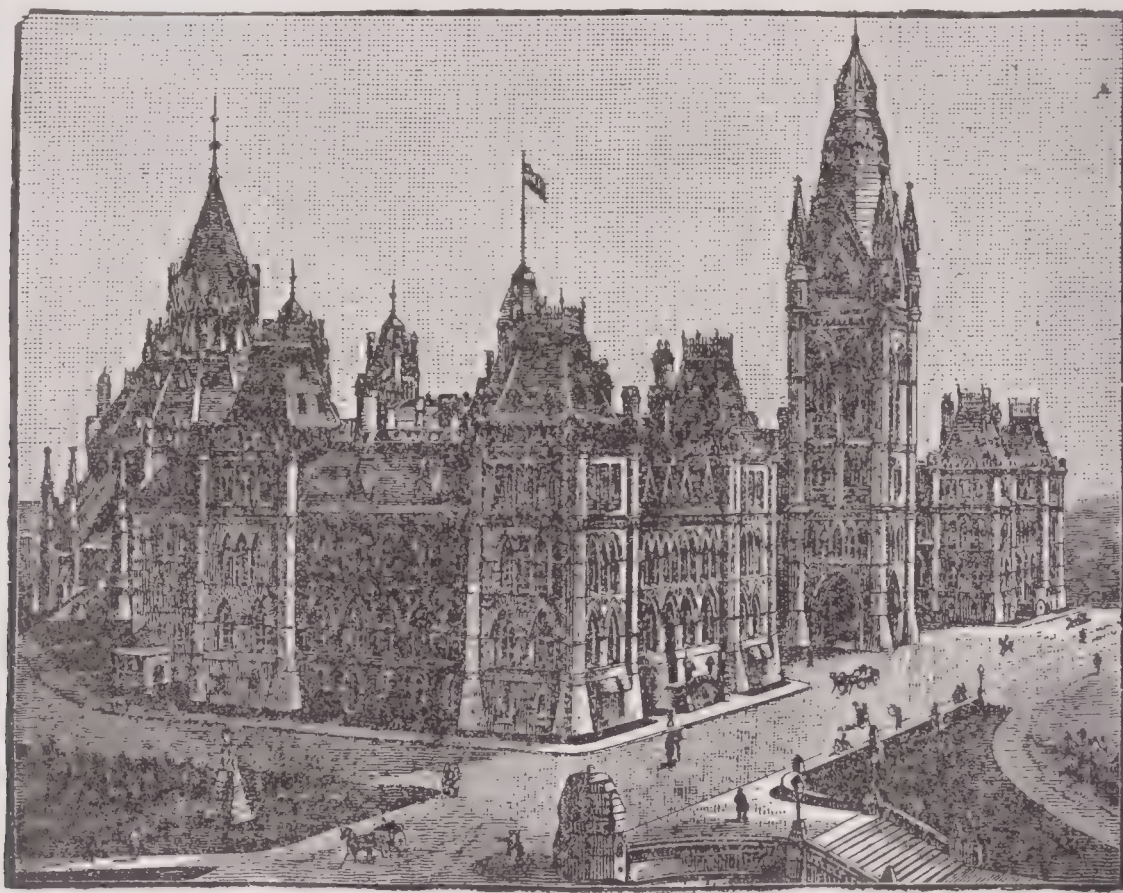
Ottawa

perhaps the largest lumber trade in the world. The passage of timber over falls and rapids has been greatly facilitated by the construction of dams and slides.

Ottawa, city and county-seat of La-salle co., Ill.; at the confluence of the Illinois and Fox rivers, on the Illinois and Michigan canal, and on the Burlington Route and the Chicago, Rock Island, and Pacific railroads; 85 miles S. W. of Chicago. Here are Pleasant View College (Luth.), St. Francis Xavier Academy, Ryburn Memorial Hospital, business college, Reddick Library, court house, street railroad and electric light plants, National banks, and several daily and weekly newspapers. It has

and foundry products, and an assessed property valuation of over \$1,000,000. Pop. (1900) 6,934; (1910) 7,650.

Ottawa, a city of Ontario, Canada, capital of the Dominion of Canada, and county-seat of Carleton co. It is situated on the right, or S., bank of the Ottawa, at its junction with the Rideau and Gatineau rivers, and on the Rideau canal and the Canadian Pacific, the Grand Trunk, and the New York and Ottawa railways, 101 miles W. of Montreal and 225 miles N. E. of Toronto. In 1907 an air line from Quebec to Ottawa was under construction. By the Rideau canal the city is connected with Kingston at the head of Lake Ontario and



OTTAWA: MAIN PARLIAMENT BUILDING.

manufactories of window glass, bottles, and lamp chimneys, drain-tile, sewer-pipe, fire-brick, organs, carriages, flour, saddlery, pumps, harness, lumber, agricultural implements, etc., and an assessed property valuation of over \$1,000,000. Pop. (1900) 10,588; (1910) 9,535.

Ottawa, a city and county-seat of Franklin co., Kans.; on the Marais des Cygnes river, and on the Missouri Pacific, and the Atchison, Topeka, and Santa Fé railroads; 58 miles S. W. of Kansas City. Here are the Ottawa University (Bapt.), Chautauqua Assembly, high school, public library, Santa Fé Hospital, National and State banks, gas and electric lights, and daily and weekly newspapers. It has manufactories of carriages, furniture, soap, flour,

steamers ply down the Ottawa river to Montreal. The site is beautiful and commanding. Both the Ottawa and Rideau rivers form picturesque falls, named Chaudière and Rideau, respectively, opposite the city. The Rideau canal divides Ottawa into the Upper and Lower towns. For two miles the city's front lies along the right bank of the Ottawa, which rises nearly midway in a number of bold bluffs, on which, at a height of 160 feet above the river, are the magnificent Parliament buildings, of Gothic architecture. The industrial and commercial part of the city, including the lumber district about Chaudière falls, lies to the S. of Parliament hill. Sparks street is the leading business thoroughfare. On the opposite side of the river, in the province of Quebec, is the suburban city of Hull (*q. v.*),

connected with Ottawa by the Chaudière bridge. The area of Ottawa is 3,365 acres, of which 443 acres are in parks.

Buildings, Parks, Statuary, and Bridges.—The foremost edifices are the buildings of the Parliament House and government departmental offices, built of cream-colored sandstone on Parliament hill. These were begun in 1859, partly finished in 1865 at a cost of over \$5,000,000, after which new departmental buildings have been and are still being constructed. Behind the central building, which has a fine tower and is occupied by the Senate and the House of Commons, is the building of the Parliamentary Library, a handsome polygonal edifice, which contains over 250,000 volumes. Parliament square, in which the buildings are situated, is beautifully laid out in lawns and flower beds. Other noteworthy buildings are the Carnegie Library; the Roman Catholic Cathedral of Notre Dame, in front of which is a statue of Bishop Guigues, the first Roman Catholic bishop of Ottawa; the National Art Gallery, in which is also housed the Fisheries Exhibit; the Victoria National Museum; the mint, normal school, city hall, court house and jail, post office, Lady Stanley Institute, the Contagious Diseases Hospital and various other hospitals, Christ Church Cathedral (Anglican), Rideau Hall (the residence of the governor-general), Ottawa University, Coligny Ladies' College, Collegiate Institute, and the buildings of other educational and charitable institutions.

The 16 parks include Rockliffe park (185 acres), stretching more than a mile along the river bank, with the Dominion Rifle Range 2 miles to the E., and Strathcona and Major's Hill parks. These parks are owned and maintained by the Dominion government; but there are also 12 other parks, including Lansdowne park of 70 acres, owned and maintained by the city. The beautifying of Ottawa is in charge of a permanent improvement commission, appointed by the Federal government. Besides purchasing and laying out the principal parks, this commission has constructed a series of splendid driveways across the city, N. E. to S. W., from Rockliffe park to the Experimental Farm, a distance of nearly 7 miles. A branch of the main series of driveways has been cut across the S. end of the city, and in 1907 another driveway was projected from the W. limit of the Experimental Farm N. to the Ottawa river, to connect with a series of islands which lie across the channel a mile above the Chaudière falls. The Government Experimental Farm, of 467 acres, situated on high ground one mile S. W. of the city, contains the Dominion Astronomical Observatory.

In the grounds of the Parliament buildings are fine statues of Queen Victoria, Sir John A. Macdonald, Alexander Mackenzie,

the Liberal statesman and premier, and Sir George E. Cartier, a French-Canadian Conservative leader. On Wellington street, immediately at the head of Metcalfe street, is the Harper Memorial. Near by, in Major's Hill park, is a monument to the soldiers who were killed in the Northwest Rebellion of 1885; and in City Hall square stands a monument to soldiers who fell in the Boer War. The Ottawa river is spanned by 2 fine bridges, the Chaudière bridge, just below the Chaudière falls, and the Royal Alexander or Interprovincial bridge, which crosses at Nepean Point, at the end of Major's Hill park. The Rideau is crossed by 5 bridges.

Churches and Educational Institutions.—Ottawa is the seat of a Roman Catholic archbishop and an Anglican bishop, and in addition to the Roman Catholic and Anglican cathedrals has 53 churches, namely, 11 Anglican, 9 Presbyterian, 8 Roman Catholic, 5 Methodist, 4 Baptist, 2 each Reformed Episcopal, Congregational, German Lutheran, Salvation Army, Holiness Movement, and Jewish, and 1 each Christian Scientist, Unitarian, Catholic Apostolic, and Plymouth Brethren. The educational institutions are the Roman Catholic University of Ottawa, with faculties in theology, philosophy, law, medicine, arts, music, science, and civil engineering; provincial normal school, provincial model school, Convent of the Sacred Heart, Congregation de Notre Dame, Coligny Ladies' College, Carleton School for Girls, Ashbury College for Boys, Church of England School for Girls, Conservatory of Music, Musketry School, Collegiate Institute, and several business colleges. In 1907 there were 52 public and separate schools, with about 13,000 pupils. There are also such national institutions as the Geological Museum, the Parliamentary Library, the National Art Gallery and Fisheries Exhibit, the Royal Observatory, and the Victoria Museum. Ottawa is also the center of the scientific societies of the Dominion, and the Royal Canadian Academy has its headquarters here. Being the residence of the governor-general and the focus of political life, the social activities of the city, especially during the parliamentary session, are unusually interesting.

Charities, Theaters, Newspapers, etc.—The leading charitable institutions are the General and Protestant hospitals, the Contagious Diseases Hospital, Lady Stanley Institute for training nurses, Home for Convalescents, Orphans' Home, and Home for the Aged. There are 3 theaters: the Russell, Grand Opera House, and Vaudeville. The principal hotels are the Russell, Windsor, Grand Union, and Brunswick. Ottawa has 4 daily newspapers, the "Citizen," "Free Press," "Evening Journal," and "Temps," besides a number of weekly and religious newspapers.

Industry, Commerce, etc.—It is estimated that within 45 miles of Ottawa there is water power capable of developing 950,000 horse power; of this amount about 237,500 horse power is within 10 miles of the city limits, and about 10,000 within the city limits. This latter is utilized in a very large number of sawmills, which have an annual output of more than 250,000,000 feet of lumber, valued at about \$6,000,000, and in various other industrial establishments, including manufactories of sawmill machinery, agricultural implements, matches, indurated fiber ware, pulp, paper, furniture, stoves and furnaces, doors and sashes, brooms and brushes, mica, bricks, cement, tents and army supplies, street cars, carriages and wagons, pianos and organs, brass goods, clothing, boots and shoes. There are also engraving and bookbinding establishments, iron foundries, electric light, power, and heat works. While the manufacture of lumber is the chief industry, the great water power available, which permits the use of electricity in manufacturing, has largely increased other industries in variety and extent. There are 24 banks. Local transportation is provided by an excellent city and suburban electric railway service, which gives workmen the advantage of cheap and comfortable homes. The water works, sewerage, gas and electric lighting plants, and the electric street railways are owned and operated by the municipality. In 1907 the city's valuation for civic assessment was \$41,318,150; municipal assets, \$6,094,504; municipal liabilities, \$7,421,906.

History.—Ottawa was founded in 1827 by Colonel By, an English engineer sent out by the British government to build the Rideau canal to connect the Ottawa river with the Great Lakes. The workmen's shacks were built on the bluff where the Parliament buildings now stand. The settlement was called Bytown. It was incorporated as a town in 1847, and in 1854 as a city, taking its present name. Queen Victoria selected it as the Canadian capital in 1858. The cornerstone of the Parliament buildings was laid by the Prince of Wales, now Edward VII., in 1860. A large part of the city was destroyed by fire on April 26, 1900, with a loss of \$20,000,000 worth of property. Pop. (1891) 44,156; (1901) 59,902; census (Mch. 31, 1910), 86,130, about equally divided between English and French.

Ottawa University, a coeducational institution in Ottawa, Kans.; founded in 1865 under the auspices of the Baptist Church; has grounds and buildings valued at over \$105,000; endowment funds, \$160,000; scientific apparatus, etc., \$8,000; volumes in the library, 5,000; ordinary income, about \$25,000; average number of faculty, 20; average student attendance, 325; graduates, over 400.

Otter, in zoölogy, the genus *Lutra*, and especially *L. vulgaris*, the common otter.

The animals vary greatly in size; but the total length averages about 40 inches, of which the tail constitutes rather more than a third. The fur is of a soft, brown color, lighter on throat and breast, and consists of long, coarse, shining hairs, with a short under fur of fine texture. The otter lives exclusively on fish, and is therefore rarely met with far from water. The female produces from three to five at a birth, usually in March or April, and brings them up in a nest formed of grass, and usually in a hollow in a river bank or in the shelter of the roots of some overhanging tree. Otters have a wide geographical range, and greatly resemble the type-species *L. vulgaris*.

Otterbein University, a coeducational institution in Westerville, Ohio; founded in 1847 under the auspices of the United Brethren; has grounds and buildings valued at over \$220,000; endowment, \$145,000; volumes in the library, about 14,000; ordinary income, about \$45,000; average number of faculty, 30; average student attendance, 460; graduates, over 850.

Otterburn, a township of England, Northumberland co., 20 miles N. N. W. of Hexham. About half a mile from the village is an obelisk marking the spot where Earl Douglas fell in the battle of Chevy Chase (*q. v.*), in 1388.

Ottery St. Mary, a town of Devonshire, on the river Otter, 11 miles E. of Exeter. Twice the scene of a great conflagration, in 1767 and 1866, it retains its magnificent collegiate church, a reduced copy of the cathedral of Exeter, with the only other transeptal towers in England. Alexander Barclay was a priest here; Coleridge was a native; and "Clavering" in "Pendennis" is Ottery St. Mary, the Devonshire residence of Thackeray's stepfather. Silk shoe laces, handkerchiefs, and Honiton lace are manufactured.

Ottoman Empire. See TURKEY.

Ottrelite, a silicate of alumina with protoxides of iron and manganese and water. It occurs in the form of thin hexagonal plates or tables in certain more or less metamorphosed slates, which are hence termed ottrelite slate.

Ottumwa, a city and county-seat of Wapello co., Iowa; on Des Moines river, and on the Burlington Route, the Iowa Central, the Wabash, and other railroads; 75 miles W. of Burlington. The city has a United States Government Building, Normal School, business college, Hawkeye Hospital, court house, National and State banks, and daily and weekly newspapers. It is in a rich coal region, and contains oil and starch mills, iron works, meat-packing plant, and numerous other industries. The assessed property valuation is nearly \$3,000,000. Pop. (1900) 14,001; (1910) 22,012.

Otway, Thomas, an English dramatist; born in Trotton, Sussex, in 1652; educated

at Winchester, and at Christ Church, Oxford; served as cornet in the Low Countries; was an unsuccessful actor, and finally wrote for the stage. Of his many plays, one tragedy, "Venice Preserved," is among the best remembered of the Restoration drama, and keeps his name familiar in literary allusion. "The Orphan" ranks next in critical esteem. He died in 1685.

Ouabain, a crystalline glucoside separated from the wood and roots of *Carissa shimperi*, a plant growing on the E. coast of Africa. It is intensely poisonous, a 12th of a grain being sufficient to kill a rabbit. It acts upon the heart in the same way that digitalis does, and has been employed in medicine as a substitute for digitalis, and also to lessen the violence of the paroxysms in whooping cough. The Somalis make an extract of the wood and roots for an arrow poison.

Ouachita College, a coeducational institution in Arkadelphia, Ark.; founded in 1886 under the auspices of the Baptist Church; has grounds and buildings valued at over \$115,000; endowment, \$25,000; scientific apparatus, etc., \$50,000; volumes in the library, 12,000; ordinary income, \$75,000; average number of faculty, 30; average students, 400; graduates, over 500.

Oubliette, a dungeon constructed in some old castles and buildings, in which were confined persons condemned to perpetual imprisonment or to secret death. It was entered by a staircase or steps reaching to the top of a chamber, in the floor of which was an opening into the dungeon. This opening served also for the admission of light and air.

Oudenarde, a town of Belgium, on the Scheldt, 37 miles W. of Brussels. It has a fine Gothic town hall (1535) and two interesting churches. Margaret of Parma was born here. In 1706 Oudenarde was taken by Marlborough; and an attempt made by the French to retake it brought on the famous battle of Oudenarde, the third of Marlborough's four great victories, which was gained, on July 11, 1708, with the aid of Prince Eugene, over the French under the Duke of Burgundy and Marshal Villars.

Oudh, a province of British India, separated on the N. from Nepal by the lower ranges of the Himalaya, whence it gradually slopes, a great plain watered by the Gumti, Gogra, and Rapti rivers, to the Ganges; area, 24,246 square miles. Formerly an independent province, it has formed a part of the United Provinces of Agra and Oudh since 1902; pop. (1901) 47,696,324. The bulk of the inhabitants are Hindus, though the dominant native race for centuries has been Mohammedan. The Brahmans are the most numerous class, about one-eighth of the whole pop-

ulation. The principal towns are Lucknow (the capital), Faizabad, Bahraich, Shahabad, Rai Bareli, Ajodhya. Oudh is believed to have been one of the oldest seats of Aryan civilization in India. After being the center of a long native Hindu dynasty it was subjugated by the ruler of Kanauj, and in 1194 was made subject to the Mussulman empire of Delhi. In 1732-1743 it became virtually an independent state, and the dynasty of the Nawabs lasted till the annexation of the province by the British in 1856. During the mutiny of 1857 Oudh was one of the centers of rebellion and the scene of highly dramatic events.

Oudinot, Charles Nicolas, Duke of Reggio and Marshal of France; born in Barsur-Ornain, in 1767. He entered the army when 19 years of age, and when the Revolution broke out held the rank of captain. He embraced the popular cause, and rising to the rank of general, accompanied Massena into Italy as one of his staff officers, in 1799. His fortunes from this time were linked with those of Napoleon till the capitulation of Paris, March 31, 1814, when he became a Bourbonist. In that character he headed the army that invaded Spain in 1823, and was resident at Madrid some months as governor. He succeeded Marshal Moncey as governor of the Invalides in 1842, and died in 1847. His son, CHARLES NICOLAS-VICTOR OUDINOT, Duke of Reggio (1791-1863), was a general in the French army. He first distinguished himself in Algeria, and was general of the French expedition against Rome in 1849.

Ouida, pseudonym of the novelist LOUISE DE LA RAMÉ; born about 1840; spent part of her girlhood with her mother at Bury St. Edmunds.

About 1874 she was living in London at the Langham, and afterward Florence was her chief abode. She was writing for "Colburn's New Monthly" and "Bentley's Magazine" as early as 1861; and among more than a score of novels by her may be mentioned "Strathmore"

(1865), "Idalia" (1867), "Under Two Flags" (the best, 1868), "Puck" (1869), "Folle Farine" (1871), "Pascarel" (1873),



OUIDA.

"Ariadne" (1877), "Moths" (1880), "Princess Napraxine" (1884), "Two Offenders" (1894), "A Story of Venice" (1895), "Town" (1897), "La Strega" (1899), etc. She died Jan. 25, 1908.

Oules, Walter William, an English painter; born in St. Helier's, Jersey, Sept. 21, 1848; studied at the Royal Academy, and began as a painter of genre, but distinguished himself chiefly in portraiture. He was elected R. A. in 1881. Darwin, Newman, Lord Selborne, Sir Fred. Roberts, Cardinal Manning, Samuel Morley, M. P., and other celebrities were among his sitters.

Ounce, a unit of weight. In Troy weight, the ounce is one-twelfth of a pound, contains 20 pennyweights of 24 grains each, and is, therefore, equivalent to 480 grains. In avoirdupois weight, the ounce is the sixteenth part of a pound, and is equivalent to 437½ grains Troy. Also a money of account in Morocco, valued about six cents. In zoölogy; *Felis uncia*, the snow leopard; habitat, the Himalayas, at an elevation ranging from 9,000 to 18,000 feet. It is about the size of a leopard, of which it is probably an immature form; ground color pale yellowish-gray, dingy, yellowish-white beneath. The fur is thick, and it has a well marked short mane. It has never been known to attack man.

Oundle, a small but ancient and pleasant town of Northamptonshire, England, 13 miles S. W. of Peterborough; has an old church, partly Early English and partly Decorated style, restored in 1864. Here St. Wilfrid died. Laxton's grammar school dates from 1550.

Ourebi, in zoölogy, *Scopophorus ourebi*; from South Africa; about two feet high at the shoulder, length four feet; pale tawny above, white below. The horns of the adult male are five inches long, straight, pointed, and boldly ringed at the base. The female is hornless.

Ouse, a river of England, York county, formed by the junction of the Swale and Ure, and after a S. E. course of 60 miles, unites with the Trent to form the estuary of the Humber. It is navigable for large vessels 45 miles, or to York. OUSE (GREAT) rises near Brackley, Northampton county, and after a N. E. course of 160 miles, two-thirds of which is navigable, enters the Wash at Lynn Regis. OUSE (LITTLE) or BRANDON RIVER, falls into the Great Ouse, at the junction of the river Stoke, and the New Bedford and Wisbeach canal.

Ouseley, Sir Frederick Arthur Gore, an English composer; born in London, England, Aug. 12, 1825, only son of Sir Gore Ouseley. He succeeded his father in the baronetcy in 1844, and subsequently took orders. He exhibited from childhood high

musical ability, took the degree of Bachelor of Music at Oxford in 1850, and of Doctor in 1855, and the same year was appointed precentor of Hereford Cathedral. His works include treatises on "Harmony," on "Counterpoint," and "Fugue," and on "Musical Form" and general composition, and he wrote much Church music. He died in Oxford, April 6, 1889.

Outcrop, in mining and geology, a term used by miners, but now adopted by geologists, for the exposure of any portion of a stratum which comes out upon the surface, or for the part of the stratum thus exposed.

Outlanders. See UITLEANDERS.

Outlawry, the act of outlawing; the state of being outlawed; the putting a man out of the protection of the law, or the process by which a man is deprived of that protection, as a punishment for contempt in refusing to appear when called into court. Formerly any one might kill an outlawed person without incurring any penalty, but now the wanton killing of an outlaw is considered as murder. In the United States, in the case of notorious felons, a proclamation of outlawry sometimes issues from either the governor of a State or the President of the United States, and the proclamation is usually accompanied by a promise of pecuniary reward for the delivery of the criminal to the authorities either dead or alive, the captor being thus left to exercise his own discretion as to the taking of life.

Outram, Sir James, an English military officer; born in Butterley Hall, Derbyshire, England, Jan. 29, 1803. His father dying in 1805, he was brought up in Scotland, studied at Marischal College, Aberdeen, and in 1819 went out as a cadet to India. In 1828 he was selected to undertake a mission to the wild hill tribes of the Bombay presidency, a task in which he acquitted himself with credit. As adjutant to Lord Keane he took part in the Afghan war of 1839, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised as a native devotee through the enemy's country to Kurrachee (1840). After the capture of Ghuznee, he performed the duties of British resident at Hyderabad, Sattara, and Lucknow. In 1842 he was appointed commissioner to negotiate with the Ameers of Scinde, in which position he adopted views at variance with the suggestive policy of General Sir Charles James Napier. In 1856 he was nominated chief commissioner of Oudh. He was Commander-in-Chief of the British forces in the Persian war of 1856-1857, and from Persia was summoned to India to aid in suppressing the mutiny. Though of higher rank than Have-lock, whom he joined with reinforcements

at Cawnpur, in September, 1857, he fought under him till Lucknow was relieved by Sir Colin Campbell. In the following March he commanded the 1st Division of infantry when Sir Colin finally regained possession of Lucknow. His services were rewarded with a baronetcy, the rank of Lieutenant-General, the order of the grand cross of the Bath, and the thanks of Parliament; and statues were erected in his honor in London and Calcutta. The shattered state of his health compelled him to return to England in 1860, and he died in Paris, March 11, 1863, and was buried in Westminster Abbey.

Outrigger, in its proper sense, a beam or spar fastened horizontally to the crosstrees or otherwise, for the purpose of extending further from the mast or topmast the backstay or other rope by which that mast or topmast is supported. The power of the stay is thus increased. The term is also applied to the contrivance used in very narrow racing boats, by which the oar is given the requisite amount of play outboard, which, owing to the extreme narrowness of the shell or gig, is not possible without the use of the outrigger.

Outworks, all works of a fortress which are situated without the principal line of fortification, for the purpose of covering the place and keeping the besiegers at a distance.

Ouzel, or **Ousel**, an old name of the blackbird (as in "Midsummer Night's Dream"); but also applied to other birds. Thus, one British thrush (*Turdus torquatus*) is called the ring ouzel, and the dipper is very generally known as the water ouzel.

Oval, an egg-shaped curve or curve resembling the longitudinal section of an egg. The oval has a general resemblance to the ellipse, but, unlike the latter, it is not symmetrical, being broader at one end than at the other.

Ovampos, or **Ovambo**, also called Otjiherero, an industrious and peaceable Bantu people of the W. coast of Africa, inhabiting the country S. of the Cunene. Ovampoland is accordingly in the German protectorate, and extends from Damaraland N. to the Portuguese frontier. Some 50 miles from the coast the country rises into a lofty tableland, which is moderately fertile, and then declines to the S. and E. into the deserts of the Kalihari and the region of Lake Ngami. Many strong indications of copper ore are found in various places. Ivory is still traded in.

Ovarian Cysts, in pathology, one of the three kinds of tumors occasionally arising in the ovary. It consists in the conversion of the gland, or parts of it, into cysts. They may be (1) simple or unilocular; (2)

compound, multilocular, or proliferous; or (3) dermoid. The second is the most common form. Ovarian cysts tend to grow to a great size. They are often fatal within four years unless healed by a successful operation.

Ovariectomy, the operation of removing the ovary, or a tumor in the ovary; a surgical operation first performed in 1809, and long considered exceedingly dangerous, but latterly performed with great and increasing success, especially since the adoption of the antiseptic treatment inaugurated by Lister.

Ovary, in botany, a hollow case placed at the base of the pistil, and containing one or more cells inclosing ovules. Called by Linnaeus the germen. Its normal state is to be superior to the calyx; but in some cases it is adherent to the tube of the calyx, when it is called inferior. It may also be parietal. In physiology, the organ in which the ova or germs of the future offspring are formed and temporarily contained. It consists of an outer fibrous coat and a parenchyma, or stroma. In the human female the right and left ovary are two oval compressed bodies, attached to the uterus by a narrow fibrous cord, and more slightly by the fimbriated ends of the Fallopian tubes, which admit of the passage of the ovum from the ovary to the uterus, and, if it becomes impregnated, it remains there till the embryo is fully developed.

Oven, a close chamber in which substances are baked, heated, or dried; a chamber in a stove or range in which food is baked. Ovens are used for various purposes, as the cooking of food, the baking of clay and ceramic ware, the annealing of glass, the roasting, annealing of iron, etc.

Oven Birds, birds belonging to the family *Certhiidae*, or creepers, found in South America; typical genus, *Furnarius*. They are all of small size, and feed upon seeds, fruits, and insects. Their popular name is derived from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

Ovenshine, Samuel, an American military officer; born in Pennsylvania, April 2, 1843; was commissioned a 2d lieutenant in the 5th United States Infantry, Aug. 5, 1861; promoted captain in 1864, major in 1885, and colonel of the 23d Infantry in 1895. He was a Brigadier-General of volunteers in 1898-1899, and in the latter year was promoted Brigadier-General, U. S. A., and retired. His last active service was in the Philippine Islands.

Ovens River, a river in the N. E. of Victoria, Australia; a tributary of the Murray. The district is an important gold mining and agricultural one.

Overbeck

Overbeck, Friedrich, a German painter; born in Lübeck, Germany, July 3, 1789. He commenced his artistic studies in Vienna in 1806, and in 1810 went to Rome, where he, with Cornelius, Schadow, Veit, and Schnorr, founded a new school of art, which subordinated beauty to piety, and attempted to revive the devotional art of the pre-Raphaelite period. In 1814, in company with several of his artistic brethren, he adjoined Lutheranism, embraced the Roman Catholic faith, and made Rome almost exclusively the place of his abode. Among his chief works are: "The Entrance of Christ Into Jerusalem" "Christ on the Mount of Olives"; "The Entombment"; "The Triumph of Religion"; "The Vision of St. Francis"; two series of frescoes, one on "The History of Joseph" for the Casa Bartholdi, and one on Tasso's "Gerusalemme Liberata" for the Villa Massimi at Rome; etc. He died in Rome, Nov. 12, 1869.

Overbury, Sir Thomas, an English author; born in Warwickshire, England, in 1581, and studied at Oxford. He contracted an intimacy with the Earl of Rochester, then Robert Carr, at the court of James I., and provoked the anger of the Countess of Essex by endeavoring to dissuade his friend from marrying her. Rochester had the address to procure the imprisonment of his friend in the Tower of London, by creating a cause of offense between him and the king, and, some months later, caused him to be poisoned there, September 15, 1613. Though suspicions were entertained at the time, it was not till 1616 that this deed of darkness was discovered, when the inferior agents were all apprehended, tried, and executed. Rochester, now Earl of Somerset, and the countess were also tried and condemned, but they were both pardoned by the king for private reasons. Overbury's "Characters," and "The Wife," a didactic poem, published in 1614, have still a reputation.

Overijssel, or Overyssel, a province of the Netherlands; area, 1,283 square miles. It is watered by the Ijssel, which separates it from Gelderland, and by the Vecht and its affluents. Except a strip along the Ijssel, presenting good arable and meadow land, the surface is mostly a sandy flat relieved by hillocks, and the principal industry is stock raising and dairy farming. Chief towns, Zwolle, Deventer, Almelo, and Kampen. Pop. (1908) 379,834.

Overland Route, a term applied to the oldtime route to California as distinguished from the route via the Isthmus of Panama. Also a term first used for the route from Europe to India via Egypt, the desert, and Suez. It was in contradistinction to the Cape route (by the Cape of Good Hope), which was by water only. It became more

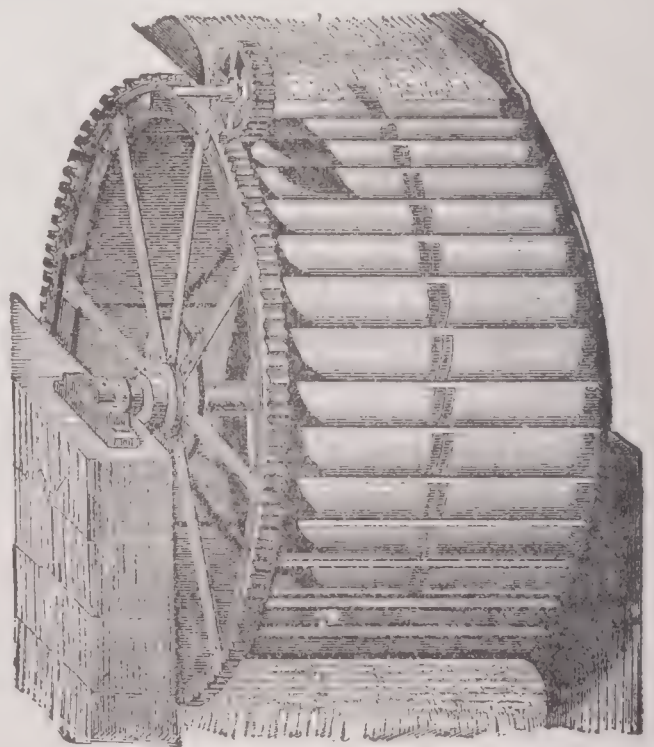
Overskov

applicable in 1837, when the route was across the European continent by Marseilles; in 1845, when that by Trieste followed; and in 1872, when that via the Mount Cenis tunnel and Brindisi came into use. The opening of the Suez Canal in 1869 having all but superseded the Cape route, the term "overland route," as applied to this route, is now obsolescent.

Overlap, a term in geology. When the upper beds of a conformable series of strata extend beyond the bottom beds of the same series, the former are said to overlap the latter. Hence strata showing this structure constitute an "overlap."

Overseer, in some of the States a county officer, whose main duty is to make provision for the poor of the county. They are appointed or elected annually. The primary duty is to administer the funds for the relief and support of the poor of their respective townships. Overseer of roads, a county officer in some of the States whose duty it is to see that the public roads are kept in good order, and to make repairs thereon whenever such repairs are necessary.

Overshot Wheel, a form of water wheel in which the water flows upon or near the top of the wheel. It acts principally by



OVERSHOT WHEEL.

gravity, though some effect is of course due to the velocity with which the water arrives. Some overshot wheels have a circular rack or cogged rim near the periphery, so as to bring the body of water in close proximity to a pinion which communicates the motion to the machinery.

Overskov, Thomas, a Danish dramatist; born in Copenhagen, Denmark, Oct. 11, 1798. His first comedy (1826) was a complete failure, but later his dramas were

successfully performed; one of them, "Ostergade og Vestergade," in the style of Sheridan, being his best work, and another, "Capriciosa," still keeping its place in the repertory of the Royal Theater. His most important contribution to literature is a "History of the Danish Theater" (Copenhagen, 1854-1876). He died in 1873.

Overture, in music, an introductory symphony for instruments, chiefly used as an introduction to important musical compositions, as operas, oratorios, etc. Its principal themes are often taken from the work it precedes. In Presbyterianism, a petition or proposal from a Presbytery, or an individual, to the highest court, which is the General Assembly or the Synod, that a new law be created, an old one amended or repealed, or a measure carried into effect. The term was borrowed from the Huguenots.

Ovid, Publius Ovidius Naso, a Roman poet of the Augustan age, of the equestrian order; born in Sulmo, 43 B. C. He studied the law, and is said to have pleaded with eloquence in the court of the centumviri; he was also constituted one of the triumviri, whose authority extended to the trial of capital causes; but his decided predilection for polite literature, and particularly poetry, led him to neglect severer studies, and on succeeding to the paternal estate, he quitted the bar for poetry and pleasure. Horace and Propertius were his friends, and Augustus was a liberal patron to him; but he at length fell under the displeasure of the emperor, who, for some cause never explained, banished him from Rome, and sent him to live among the Getæ, or Goths, on the Euxine. It is probable that the political intrigues of the Empress Livia and her son Tiberius contributed to the removal of the poet; while the licentiousness of his writings, and the irregularities of his life, afforded plausible pretexts for the infliction of this punishment. His chief works are "The Loves," "The Art of Loving," and the "Metamorphoses." He in vain solicited his recall to Rome, and died in Tomi, A. D. 18. Ovid was born a poet—he "lisp-ed in numbers, for the numbers came"; and that he possessed high poetical genius is unquestionable. His judgment and taste, however, are sometimes at fault, and the vigorous fancy and warmth of coloring displayed in some parts of his works are necessary to counterbalance the false taste and frigid conceit which present themselves in others. At the same time, it must be granted that no poet, either ancient or modern, has expressed beautiful thought in more appropriate language.

Oviduct, the name given to the canal by which, in animals, the ova or eggs are conveyed from the ovary to the uterus or into

the external world. In mammals the oviducts are termed Fallopian tubes, being so named after the anatomist who first described them.

Oviedo. See ASTURIAS.

Oviedo y Valdez, Gonzalo Fernandez de, a Spanish historian; born in Madrid, Spain, in 1478. In 1545 he was appointed historian of the Spanish Indies. The first part of his great work appeared as "General and Natural History of the West Indies," in 1535; the revision of the entire work was completed in 1548. It was once deemed one of the profoundest works on the natural history of America. He died in Valladolid in 1557.

Oviparous, in zoölogy, a term, applied to birds, reptiles, fishes, and insects, whose mode of reproduction is by the exclusion of a germ in the form and condition of an egg, the development of which takes place out of the body, either with or without incubation.

Ovipositor, in entomology, an organ situated at the extremity of the abdomen of females of some insects, and serving to deposit the eggs in a position suitable for their development. In the Terebrantia it is modified so as to form a saw (*serra*) or a boring organ (*terebra*). With the exception of some ants, the ovipositor is converted into a sting (*aculeus*) in the Aculeata.

Ovolo, in architecture, a convex molding, mostly used in classical architecture; in the Roman examples it is an exact quarter of a circle; in Grecian it is more flat and quirked at the top. It is frequently used in the decorated Gothic style.

Ovule, in botany, a rudimentary seed which requires to be fertilized by pollen before it develops. It is composed of two sacs, one within another, which are called primine and secundine sacs, and of a nucleus within the sacs. At one point, the chalaza, the nucleus and the two coats come into contact, and here there is a minute orifice called the foramen or micropyle.

Ovum, in physiology, the germ produced within the ovary, and capable of developing into a new individual. It first appears as a very minute granule or globule, not surrounded by a cell wall. As it enlarges, a smaller spherical globule is formed in its interior. The external globule is called the germinal vesicle, the inner the germinal spot. Next a cell wall appears around the germinal vesicle, but separated from it by a certain interval, within which is a liquid containing globules or sarcode, the mass developing into the yolk. Then the vitelline membrane appears outside the yolk. There being little yolk in the human ovum, it is of smaller size than those of the inferior animals. It is a spherical body, about $\frac{1}{120}$

of an inch in diameter. It was first discovered by Von Baer in 1827. The germinal vesicle is $\frac{1}{720}$, and the germinal spot $\frac{1}{3000}$ of an inch in diameter. In archæology, ornaments in the form of eggs, curved on the contour of the ovolo, or quarter-round, and separated from each other by anchors or arrow heads.

Owego, a village and county-seat of Tioga co., N. Y.; at the confluence of Owego creek and the Susquehanna river, and on the Lehigh Valley, the Lackawanna, and the New York, Lake Erie and Western railroads; 22 miles W. of Binghamton. Here are the court house, Coburn Public Library, an academy, waterworks, electric lights, several National banks, and daily and weekly newspapers. The village is a popular summer resort, containing among its residences those of Benjamin F. Tracy, Gen. I. S. Catlin, Thomas C. Platt, the Rockefeller brothers, and the late Nathaniel P. Willis. There is a large agricultural and lumber trade. The village has manufacturing of machinery, woolen goods, flour, wagons, harness, and butter. Pop. (1900) 5,039; (1910) 4,633.

Owen, Goronwy, a Welsh poet; born in Anglesea, North Wales, Jan. 13, 1722. He became rector of Uppington, Shropshire, in 1745; and while there wrote his celebrated poem "The Day of Judgment." He came to the United States in 1775; accepted a position at William and Mary College, and married for his second wife Mrs. Clayton, a sister of the president of the college. He is described as the last of the great poets of Wales. His bardic title was "Black Goronwy of Anglesea." His poems for a long time circulated in manuscript; but in 1780 his collected works were published, succeeding editions being printed in 1819 and 1860. In 1831 his countrymen erected a tablet to his memory in the cathedral church of Bangor. He died in St. Andrews parish, Brunswick co., Va., between 1770 and 1780.

Owen, John, an English epigrammist; born in Armon, Carnarvonshire, England, in 1560, and had his education at Winchester and New College, Oxford, where he became a Fellow in 1584. He was afterward a schoolmaster at Warwick. He had a great reputation in his day as a writer of Latin verse, and as the "British Martial" his fame as an epigrammatist was widely spread also on the Continent. His robust Protestantism sharpened into stinging wit placed his book on the Roman "Index" in 1654. Three books of the "Epigrammata" appeared in 1606; additions were made in later editions. The best edition is that by Renouard (Paris, 1795). An English translation was published as early as 1619. He died in 1622, and was buried in St. Paul's Cathedral.

Owen, John, an English Nonconformist divine; born in Stadham, Oxfordshire, in 1616, studied at Oxford, and on the breaking out of the civil war took part with the Parliament. He adopted the Independent mode of church government. He was appointed to preach at Whitehall the day after the execution of Charles I.; accompanied Cromwell in his expeditions both to Ireland and Scotland; in 1651 was made dean of Christ Church College, Oxford, and in 1652 was nominated by Cromwell, then chancellor of the university, his vice-chancellor, offices of which he was deprived in 1657. Owen was a man of great learning and piety, of high Calvinistic views, and the author of numerous works, the most permanently valuable of which is his "Exposition of the Epistle to the Hebrews." He died in 1683.

Owen, Sir Richard, an English palæontologist; born in Lancaster, England, July 20, 1804, and educated at Lancaster Grammar School and the medical schools of Edinburgh, Paris, and London. Having settled in the metropolis he became assistant curator of the Hunterian Museum. In 1834 he was appointed Professor of Comparative Anatomy at St. Bartholomew's Hospital; in 1836, Professor of Anatomy and Physiology at the Royal College of Surgeons, and in 1856 superintendent of the natural history department in the British Museum, from which last post he retired in 1883. Owen is acknowledged to have been the greatest palæontologist since Cuvier, and as a comparative anatomist a worthy successor to Hunter. He was a voluminous writer on his special subjects, and an honorary fellow of nearly every learned society of Europe and America. Among his works are "Lectures on the Comparative Anatomy of the Invertebrate Animals"; "Lectures on the Vertebrate Animals"; "History of British Fossil Mammals and Birds"; "History of British Fossil Reptiles"; "Principles of Comparative Osteology"; "On the Anatomy of Vertebrates"; "The Fossil Reptiles of South Africa"; "The Fossil Mammals of Australia"; etc. He died Dec. 18, 1892.

Owen, Robert, an English social reformer and author; born in Newton, Montgomeryshire, Wales, March 14, 1771. He early turned his attention to social questions, publishing in 1812 "New Views of Society; or, Essays upon the Formation of the Human Character, and Book of the New Moral World." He attempted to found communist societies in England, also in New Harmony, Ind., and later in Mexico. In his later years he became a believer in Spiritualism. His followers bore the name of Owenites, and were among the founders of the English Chartist movement. He died Nov. 19, 1858.

Owen, Robert Dale, an American diplomat, son of Robert; born in Glasgow, Scotland, Nov. 7, 1801; was educated in Switzerland; removed to the United States in 1823; was Representative to Congress from Indiana (1843-1847); and minister to Naples (1855-1858). During the Civil War he was a prominent advocate of negro emancipation. Among his works are: "Moral Physiology" (1831); "Footfalls on the Boundary of Another World" (1860); "Beyond the Breakers" (1870), a novel; "Threading My Way" (1874). He died in Lake George, N. Y., June 17, 1877.

Owen Meredith. See LYTTON, EDWARD ROBERT.

Owensboro, a city and county-seat of Daviess co., Ky.; on the Ohio river, and on the Louisville, Henderson, and St. Louis, the Chesapeake, Ohio and Southwestern, and the Louisville and Nashville railroads; 40 miles S. E. of Evansville, Ind. Here are Owensboro Female College (non-sect.), a United States Government Building, water-works, street railroad and electric light plants, and daily and weekly newspapers. The city is noted for its large tobacco interests, turning out more than 18,000,000 pounds annually. It also has manufactories of flour, shingles, brick, ice, sewer-pipe, furniture, etc., and an assessed property valuation of about \$4,000,000. Pop. (1890) 9,837; (1900) 13,189; (1910) 16,011.

Owens College, Manchester, England, an institution established under the will of John Owens, a Manchester merchant, who died in 1846, and left about \$500,000 for the purpose of founding an institution for providing a university education, in which theological and religious subjects should form no part of the instruction given. Teaching commenced in 1851, and the present handsome Gothic building for the accommodation of the college was completed in 1873. The increasing success of the college led to the establishment of a new university, Victoria University, to consist of Owens College and several affiliated colleges located in different towns, but having its headquarters in Manchester. The Victoria University was instituted by royal charter in 1880, with power to grant degrees in arts, science, and law, a supplemental charter, granted May, 1883, giving power to grant degrees in medicine. University College, Liverpool, was incorporated with Victoria University in 1884, and the Yorkshire College, Leeds, in 1888. There is a women's department in connection with Owens College, the classes being held in separate buildings. The charter of Victoria University gives power to grant degrees to women, and the examinations are thrown open to them.

Owen's Lake, a lake in Inyo co., Cal., crossed in extreme W. by 118° W., 160 miles N. by E. of Los Angeles; its water is strongly impregnated with salt and carbonate of soda; it has no visible outlet; receives Owen's river; length about 16 miles, breadth, 10 miles.

Owen's River, a river of California, which flows into Owen's lake. It is 175 miles long.

Owen Sound, a town in Ontario, Canada, 34 miles W. by N. of Collingwood, at the head of a long bay of the same name off Georgian Bay. It has a dry dock, 300 feet long, 55 feet wide, and 12 feet deep on sill at high water ordinary springs.

Owen Stanley Range, a portion of a range of lofty mountains in the E. part of British Guinea. Mount Owen Stanley is a peak 13,130 feet high.

Owl, in ornithology, a popular name for any nocturnal raptorial bird, of which about 200 species are known. Their classi-



GREAT SNOW OWL.

fication is in a very unsettled state. Willoughby's division into two sections—one having "ears" or "horns," as the tufts of feathers on their heads were called, the other destitute of such appendages—was shown to be unnatural by Geoffroy St. Hilaire. They were formerly made a family of Accipitres, of Raptores, but are now more generally raised to an order (or at least a sub-order), *Striges*. Following Alphonse Milne-Edwards, a classification has been proposed, based on pterylogical and osteological characters, broadly dividing the owls into two sections: (1) The screech-owl, and (2) the tawny-owl section, with (the Linnaean) *Strix flammea* and *S. stridula* as the respective types. The former is known as the Alucine (from Fleming's name for the genus, *Aluco*), and the latter as the Strigine section. The prevailing

Owl Parrot

color of the plumage is brown, with a tinge of rusty-red, and it is exceedingly loose and soft, so that their flight (even in the larger species) is almost noiseless, enabling them



ROCK OWL.

to swoop upon their prey, which they hunt in the twilight. All owls cast up in the form of pellets the indigestible parts of the food swallowed. These castings may be seen under any owl-roost, and show plainly the great service these birds render to man in destroying rats and mice. They range over the whole globe.

Owl Parrot (*Strigops habroptilus*), the type and only known representative of a peculiar group of the parrot family, is a large bird, a native of the South Pacific Islands, and especially of New Zealand. In aspect and in nocturnal habits it resembles the owl. It feeds on roots, which it digs out of the earth with its hooked beak. It seldom flies; it is generally to be seen resting in hollow stumps and logs, and is said to hibernate in caves.

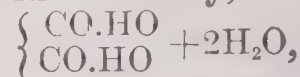
Owosso, a city in Shiawassee co., Mich.; on the Shiawassee river, and on the Michigan Central, the Detroit, Grand Haven, and Milwaukee, and the Ann Arbor railroads; 38 miles S. W. of Saginaw. It contains libraries, waterworks, street railroad and electric light plants, several banks, and a number of daily and weekly newspapers. It has manufactories of door and window screens, hickory handles, caskets, furniture and dining-room tables, and an assessed property valuation of nearly \$4,000,000. Pop. (1900) 8,696; (1910) 9,639.

Ox, the castrated male of *Bos taurus* when arrived at maturity; also the popular name for the genus *Bos*. It has been known from remote antiquity, and in the East possessed, and in India still possesses, a

Oxaluria

sacred character. They have been broadly divided into two groups — the humped, with *B. indicus*, and the straight-backed, with *B. taurus* as a type. The domestic oxen consist of a great number of different breeds.

Oxalic Acid, in chemistry,



a dibasic acid existing ready formed in plants, and produced by the simple oxidation of glycollic alcohol, or by acting on starch, sugar, or cellulose, with nitric acid, or fusion with caustic alkali. It is formed commercially by fusing sawdust with a mixture of soda and potash to 204°, decomposing the oxalate with lime, and the lime salt with sulphuric acid, and afterward recrystallizing. It forms colorless, transparent prisms, soluble in eight parts of water at 15°, and in its own weight of boiling water. The solution has a strong acid reaction, and is highly poisonous. The antidote is chalk or magnesia, with which it forms an insoluble compound, which is comparatively innocuous in the stomach. The acid forms neutral or normal and acid salts, all of which are crystalline.

Oxalidaceæ, the oxalid or wood-sorrel family, an order of plants, alliance Geraniales. Symmetrical flowers, distinct styles, carpels longer than the torus, and seeds with abundant albumen. They are herbs, under-shrubs, or trees, generally distributed throughout both the hot and the temperate regions of the globe; the shrubby species, however, are almost confined to the tropics. They are chiefly remarkable for their acid juice, containing binoxalate of potash. The order contains six genera and 325 species.

Oxalis, in botany, wood-sorrel; the typical genus of the *Oxalideæ* or *Oxalidaceæ*. The calyx has no bracts, the filaments are slightly combined below, the capsule is angular, five-celled, the seeds with an elastic integument. Known species, 220; chiefly from South Africa and South America. *O. acetosella* is the common wood-sorrel. The leaves are all radical and trifoliate; handsome white flowers, with purplish veins. Found in woods and other shady places, and in nooks on mountain sides. *O. corniculata* is the yellow prominent wood-sorrel. *O. stricta*, possibly only a sub-species of the last. The stalks of *O. crenata*, a Columbian species, are very acid, and make a good preserve. *O. esculenta*, *O. deppei*, *O. crassicaulis*, and *O. tetraphylla* have eatable tubers. *O. sensitiva*, *O. stricta*, and *O. biophytum* have sensitive leaves. Those of *O. sensitiva* are tonic and slightly stimulating.

Oxaluria, a morbid condition of the system, in which one of the most prominent symptoms is the persistent occurrence of

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crystals of oxalate of lime in the urine. These crystals most commonly occur as minute transparent octohedra, but sometimes in the form of dumb-bells. Persons who secrete this form of urine are usually dyspeptic, hypochondriacal, and liable to attacks of boils, cutaneous eruptions, and neuralgia. The oxalic acid, in these cases, is not introduced into the system with the food, but is a product of the disintegration of the tissues, and is due to the imperfect oxidation of compounds which should normally have been converted into carbonic acid.

Oxford, John, an English dramatist and critic; born in Camberwell, England, in 1812, and was originally educated for the bar, but early turned to a life of letters, made himself familiar with French, German, and Spanish literature, and soon made his name known by admirable translations of such notable books as Goethe's "Autobiography," and Eckermann's "Conversations with Goethe." For his last 30 years he was dramatic critic for the "Times," and his criticisms were ever characteristic of the genial kindliness of his nature. He was a fluent and graceful writer, yet his original works suggested rather than demonstrated his powers as a critic. His "Illustrated Book of French Songs" (1855) showed a dexterous mastery of the lighter forms of verse. He wrote many plays, among them the "Dice of Death," the "Reigning Favorite," the "Two Orphans," as well as the libretto for "The Lily of Killarney," and one farce at least, "Twice Killed," that became widely popular. He died in London, Feb. 21, 1877.

Oxenham, Henry Nutcombe, an English theologian; born in Harrow, England, Nov. 15, 1829; and educated at Balliol College, Oxford, taking a classical second class in 1850. He took orders in 1854, and held various curacies, but entered the Roman Catholic Church in 1857, and was successively professor at St. Edmund's College, Ware, and master at the Oratory School, Birmingham. Oxenham translated Döllinger's "First Age of the Church" (1866), and "Lectures on Reunion of the Churches" (1872), also vol. ii. of Hefele's "History of the Councils of the Church" (1876); and, besides frequent articles in the leading reviews, the following learned works came from his pen: "Catholic Doctrine of the Atonement" (1865); "Catholic Eschatology and Universalism" (1876); "Short Studies in Ecclesiastical History and Biography" (1884); and "Short Studies, Ethical and Religious" (1885). He died March 23, 1888.

Oxenstjerna, Axel, Count, a Swedish statesman; born in Fanö, Sweden, June 16, 1583, studied theology at Rostock, Wittenberg, and Jena; and in 1602, after visiting

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most of the German courts, returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the senate; and on the accession of Gustavus Adolphus, in 1611, was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs; and on the fall of his master at Lützen (1632) was recognized, at a congress assembled at Heilbronn, as the head of the Protestant League. This league was held together and supported solely by



COUNT OXENSTJERNA.

his influence and wisdom, and in 1636 he returned to Sweden after an absence of 10 years, laid down his extraordinary powers, and took his seat in the senate as chancellor of the kingdom and one of the five guardians of the queen. In 1645 he assisted in the negotiations with Denmark at Bromsebro, and on his return was created count by Queen Christina, whose determination to abdicate the crown he strongly but unsuccessfully opposed. He died in Stockholm, Aug. 28, 1654.

Oxford, a city and county borough in England; capital of Oxford co., and seat of one of the most celebrated universities in the world; about 50 miles W. N. W. of London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. Oxford, as a city of towers and spires, of fine collegiate buildings old and new, of gardens, groves, and avenues of trees, is unique in England. The oldest building is the castle keep, built in the time of William the Conqueror, and still all but entire. Of the numerous churches the first place is due to the cathedral, begun about 1160, and chiefly in the late Norman style. It not only serves as the cathedral of Oxford diocese, but also forms part of the collegiate buildings of Christ Church, of which institution the dean of Oxford is always head. Other churches are St. Mary's, used as the University Church, with a noteworthy

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tower and spire (dating about 1400), St. Philip and St. James's, a striking example of modern Gothic; All Saints' (18th century), with a Græco-Gothic spire; St. Giles's (12th and 13th century); St. Barnabas, a fine modern building. Of the university buildings the most remarkable are Christ's Church, the largest and grandest of all the colleges, with a fine quadrangle and other buildings, a noble avenue of trees (the Broad Walk), the cathedral serving as its chapel; Magdalen College, considered to be the most beautiful and complete of all; Balliol College, with a modern front (1867-1869) and a modern Gothic chapel; Brasenose College; and New College (more than 500 years old), largely consisting of the original buildings, and especially noted for its gardens and cloisters; besides the Sheldonian Theater, a public hall of the university; the new examination schools, new museum, Bodleian Library, Radcliffe Library, and other buildings belonging to the university. Oxford depends mostly on the university, and on its attractions as a place of residence. Pop. (1901) 49,413.

Oxford, University of, an English university that lays claim to great antiquity, tradition assigning its foundation to King Alfred in 879. The earliest charter was granted by King John, and its privileges were confirmed and extended by subsequent monarchs, the act by which it was created a corporate body having been passed during the reign of Elizabeth in 1570. The number of colleges established are 20, viz.:—University (founded, 1249); Balliol (1263); Merton (1274); Exeter (1314); Oriel (1326); Queen's (1340); New (1386); Lincoln (1427); All Soul's (1437); Magdalen (1456); Brasenose (1509); Corpus Christi (1516); Christ Church (1525); Trinity (1554); St. John's (1557); Jesus (1571); Wadham (1613); Pembroke (1620); Worcester (1714); and Keble (1869). There are, besides, five halls, or colleges, not incorporated, viz.:—Magdalen, St. Edmund's, St. Mary's, New Inn., and St. Alban's. The constitution of the university was changed in August, 1854, and amended in June, 1856. Each college is bound by its own statutes, but controlled by the general laws governing the university, and contributes from their members, elected by vote, to the executive and legislative departments of the university. Attached to the university is the Bodleian Library, founded by Sir Thomas Bodley, containing about 500,000 printed volumes, and more than 30,000 valuable MSS.

Oxford Clay, in geology, a bed of clay, sometimes 600 feet thick, underlying the Coral Rag, and the accompanying sandy beds of the Middle Oölite. Corals are absent, but Ammonites and Belemnites

Oxygen

abound. Remains of Ichthyosaurus, Plesiosaurus, etc., are also found.

Oxford College, an educational non-sectarian institution for women in Oxford, O.; opened in 1830, chartered in 1849; has grounds and buildings valued at over \$150,000; volumes in the library, 4,000; ordinary income, about \$40,000; average number of faculty, 25; average student attendance, 175.

Oxford, Earl of. See WALPOLE.

Oxidation, in chemistry, the chemical change which gives rise to the formation of oxides, and which is brought about by the action of oxygen acids, water, or free oxygen.

Oxide, the product of the combination of oxygen with a metal or metalloid. In the former case a base is formed, in the latter an acid radical. Sometimes the oxide acts as a quasi-acid radical and as a base.

Oxlip, in botany, *Primula elatior*; resembles the cowslip, but has the calyx teeth acuminate, the corolla pale yellow instead of buff, the limb concave, the throat without folds.

Ox-peckers, a name for certain African birds, also known as beef-eaters.

Oxus, Amoo, Amoo-Daria, or Jihoon, a large river in Central Asia, which has its sources between the Thian Shan and Hindu Kush ranges in the elevated region known as the Pamir, flows W. through a broad valley, receiving many affluents, and N. W. through the deserts of W. Turkestan, bordering on or belonging to Bokhara and Khiva, to the S. extremity of the Sea of Aral, where it forms an extensive marshy delta. It is generally held that the lower part of the course of the Oxus was at one time different from what it is now, and that the river entered the Caspian Sea. The principal head-stream of the Oxus is by some considered to be the Panja river, which rises in a lake of the Great Pamir, at a height of 13,900 feet. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course, 1,300 miles.

Oxychloride, compounds of metallic chlorides with the basic oxides of the same metals, produced by the action of water on certain metallic chlorides.

Oxycoccus, or Oxycoccus, in botany, cranberry; a genus of *Vacciniaceæ*. Corolla, rotate; stamens, eight. Two species known. One *O. palustris*, is the cranberry. The other is *O. macrocarpus*.

Oxyfluoride, in chemistry, a compound analogous to the oxychloride.

Oxygen, in chemistry, symbol O; at. wt. 16; a dyad element existing in the free state in the atmosphere, and in combination in the ocean. It forms about one-fifth of the former and eight-ninths of the latter. It

is also present in the great majority of substances forming the earth's crust, and is the most abundant of all the elements. It was discovered in 1774 by Scheele in Sweden and Priestley in England independently, but the name was given by Lavoisier some time after. It can be obtained pure by heating black oxide of manganese, or a mixture of this oxide with potassic chlorate in a retort, and collecting the gas over water. When pure it is without color, taste, or smell. It is the sustaining principle of animal life and of the ordinary phenomena of combustion. Phosphorus and ignited charcoal burn in it with great brilliancy, and a piece of watch-spring, having at the end some lighted sulphur, exhibits in oxygen a beautiful phenomenon of combustion. It is a little heavier than atmospheric air, sp. gr. = 1.1. One hundred cubic inches of oxygen at mean temperature and pressure weigh 34.29 grains. Under the influence of cold and high pressure it has been reduced to the liquid state. It enters into combination in various ways, taking the place of hydrogen in the radicals of compounds formed on any of the types, HCl, H₂O, H₃N, etc., giving rise to oxychlorides, oxyiodides, oxynitrides, etc.

Oxyhydrogen Light. See LIME LIGHT.

Oxyhydrogen Microscope, a microscope in which the object is illuminated by the incandescence of a piece of lime or marble under the action of the oxyhydrogen blowpipe, and its image, highly magnified, thrown upon a screen so that it may be visible to any number of spectators at once. Recent improvements have enabled objects to be exhibited in this way magnified 1,500 diameters.

Oxymoron, in rhetoric, a figure in which an epithet of a quite contrary signification is added to any word; as cruel kindness.

Oxyrhynchus, a celebrated Egyptian fish, sacred to the goddess Athor, and represented in sculptures and on coins. It was anciently embalmed.

Oxyria, in botany, mountain-sorrel; a genus of *Polygonæ*. Sepals four, stamens six, stigmas two, fruit broadly winged. Only known species, *O. reniformis*, the kidney-shaped mountain sorrel. Found in alpine elevations. It is common in the Punjab Himalayas, where it is used as a cooling vegetable and as medicine.

Oxysalts, in chemistry, those salts which contain oxygen. The oxysalts form a very important series of substances; among them are included all the sulphates, nitrates, oxides, hydrates, chlorates, carbonates, borates, silicates, etc.

Oxysulphide, in chemistry, compounds of metallic oxides and sulphides, or of sul-

phides in which the sulphur is partly replaced by oxygen.

Oxyuris, in zoölogy, small thread-worm; a genus of *Nematoids*, parasitic in man. The male of *O. vermicularis* is about one-sixth of an inch, and the female about half an inch long. They are gregarious, and inhabit the rectum of children and old people, occasionally straying to the lower bowel, and setting up inflammation.

Oyer and Terminer, the name of courts of criminal jurisdiction in the United States, generally held at the same time with the court of quarter sessions, and by the same judges, and which have power, as the terms imply, to hear and determine all treasons, felonies, and misdemeanors committed within their jurisdiction.

Oyster, a well-known edible shell fish, belonging to the genus *ostrea*, occurring in most parts of the world. The European oyster (*O. edulis*), which forms a considerable article of trade on the coasts of England and France, is taken by dredging, after which the animals are placed in pits formed for the purpose, furnished with sluices, through which, at spring tides, the water is suffered to flow. In these receptacles they acquire the green tinge so remarkable in the European oyster, and which is considered as adding to their value. This color, which at one time was supposed to be owing to some mineral impregnation, has recently been ascertained to arise from the *confervæ* and other marine vegetable matter on which the animal feeds. The breeding time of oysters is in April or May, from which time to July or August, the oysters are said to be "sick," or "in the milk." This is known by the appearance of a milky substance in the gills. Oysters attain a size fit for the table in about a year and a half, and are in their prime at three years of age; though what the natural term of their lives may be it is difficult, if not impossible, to determine with any degree of accuracy.

Many curious discussions have arisen as to whether oysters possessed the faculty of locomotion. It is well known that, in general, they are firmly attached to stones, or to each other; and it has been stated, and generally believed, that they were not endowed with any powers of changing their position. From the observations and experiments of naturalists, however, it appears that they can move from place to place by suddenly closing their shells, and thus ejecting the water contained between them with sufficient force to throw themselves backward, or in a lateral direction. Oysters form the basis of many culinary preparations, but are much more digestible in their raw state than after any mode of cooking them, as this process, in a great measure,

deprives them of the nourishing animal jelly which forms so large a portion of their substance. The shell of the oyster is composed of carbonate of lime and animal matter, and was at one time supposed to possess peculiar medical properties; but analysis has shown that the only advantage of these animal carbonates of lime over those from the mineral kingdom arises from their containing no admixture of any metallic substance. The lime obtained from the calcination of oyster shells, though exceedingly pure and white, is better suited for work which does not require great tenacity, as for plastering rooms, than for the common purposes of building, as it does not form as hard a compound with sand as the mineral limes.

The oysters most esteemed in the United States are the Virginian oyster (*O. Virginiana*) and the Northern oyster (*O. borealis*). In the *O. Virginiana* the shell is elongated and narrow, and the beaks pointed and not much curved; the surface of the smaller and upper valve, when not worn, presents everywhere leaf-like scales of a leaden color, and a lengthened pyramidal hinge ridge along the beak; the muscular impression is nearly central, and of a dark chestnut or violet color. This is the common oyster from Chesapeake Bay S.; it is sometimes found in the vicinity of Boston, and also at the mouth of the St. Lawrence river; it multiplies so rapidly on some of the low shores of the Southern States as to offer impediments to navigation, and to change the course of tidal currents. In the *O. borealis* the shell is more rounded and curved with the beaks short and considerably curved; the surface is very irregular, presenting loosely arranged layers of a greenish color, with the margins more or less scalloped; the muscular impression is dark violet, and the interior chalky or greenish white. This is the common New York oyster, said also formerly to have been abundant in Massachusetts Bay. Boston market is supplied principally from artificial beds derived from the Virginia and New York oysters. The flats in the vicinity of maritime cities are generally thickly beset with poles, indicating the localities of oyster beds. The principal sources of supply are the Chesapeake Bay, the coast of New Jersey, and Long Island Sound.

Formerly the oyster beds were almost wholly kept up by restocking them with seed oysters from Chesapeake Bay and from the Hudson river; but of late years the spat is secured at spawning time, and new ground in the vicinity is brought under cultivation, till the area of oyster beds in Long Island Sound is now computed by miles rather than by acres, and it is yearly extending. With constantly improving methods of culture means are also devised

for protecting the oyster to some extent from its natural enemies, and for transporting oysters to the remotest parts of the country.

Law as to Oysters.—The rule is that he who has the right of property in the soil or seashore is entitled to catch or keep a bed of oysters there. Whoever steals oysters or oyster-brood from an oyster-bed which is private property is guilty of felony; and whoever unlawfully or willfully uses any dredge, net, or instrument within the limits of a private oyster-bed, for the purpose of taking oysters, though none are actually taken, is guilty of a misdemeanor. In the United States there are various laws for the protection of the oyster industry.

Oyster Bay, a town and village in Nassau co., N. Y.; on an inlet of Long Island Sound and on the Long Island Railroad; 30 miles E. by N. of New York city. It has large oyster dredging and farming interests; is a popular place of seaside residence and resort; and in recent years has been most widely known as the home of Theodore Roosevelt and the Mecca of many political pilgrimages. Pop. of town (1900) 16,334; (1910) 21,802.

Oyster Catcher, in ornithology, *Hæmatopus ostralegus*, a handsome European bird, about 16 inches long, common on flat, sandy coasts. The head, neck, throat, scapularies, quill feathers, and latter half of the



OYSTER CATCHER.

tail feathers are deep glossy black, the rest of the plumage pure white. The bill, about three inches long, is a rich ruddy color, deepest at the base; very much compressed, with a wedge-like termination. Oyster catcher is a misnomer, for the bird feeds mostly on mussels and limpets, though it frequently takes to the water in search of food. The bird seems to lay its head sideways on the ground, and then, grasping the limpet's shell close to the rock between the mandibles, use them as scissor-blades to cut off the mollusk from its sticking place. Also any of the several American species of wading birds of the genus *Hæmatopus*.

Oyster Crab. This little crab is about the size and shape of a pea, resembling somewhat a bleached out spider. In Europe it is called the pea crab, where it is rarely seen except by naturalists, for there it is not eaten by those who like oysters, while in this country it is well known, as we often see it floating on the surface of an oyster stew. It is common on our coast, not only in oysters, but also in mussels and scallops. The name "Washington crab" has been suggested by some for the oyster crab, as it was considered a great delicacy by our first President. The crab has been known to naturalists from the earliest times of history, and the lively imaginations of writers on natural history have woven a curious network of stories about the life and home of this modest little animal. Aristotle the Greek and Pliny the Roman, naturalists, believed that a definite relation or understanding existed between the shell fish and its little lodger, and even went so far as to say that death would be the result if the crab should desert its host. The watchful crab, living within the home of the dull and stupid oyster, on seeing small fish approach, would wait till one more bold than the rest of his companions ventured within the open shell, then gently nipping the oyster, the doors would be closed, and the fish held a prisoner. Thereupon the two, the host and his guest, would feed at leisure upon the body of the venturesome fish; but the cold eye of science says that bivalves do not feed on fish, but on microscopic animals and plants which live and float in the water, and that the little crab whose limbs are so soft could have neither the strength nor the power to pinch off morsels of food from an ordinary fish.

Another story, which held its own till late in the 19th century, was that this little crab played the part of the "king's jackal," who hunted by night for his majesty the lion. It would sally forth to hunt and bring food to the helpless mussel or oyster, and on returning from the hunt, should it find the house closed, would give a cry which was recognized by its host, the door instantly opened, and it was allowed to enter. Study has shown that the crab never leaves its home, and cannot cry, but as with the lion, who, in fact, often gets the food for the jackal, so it is that the little crab feeds on the substances which are swept in by the current of water made by the bivalve in order to bring in its own food and to freshen the water for its respiration.

The oyster crab, it is true, may act in such a manner that it warns the oyster of the approach of danger, but we scarcely believe that it is anything but a personal motive on its part. We 20th century folks do not believe that any intelligent under-

standing exists between the two. We have all seen how a crab will hurry back and forth on the approach of danger, will dart into the first crevice to escape its foe, and when in safety brandish its formidable claws with the greatest show of bravery. So the little *Pinnotheres* may, with the same instinct, run back and forth within the sensitive mantle of the oyster, and retreating push against its soft body, which will indicate to the slothful intelligence of its host that something is wrong outside, when it will discreetly close its shell, as the better part of valor. The oyster crab is about the size of a large pea, the body is globular, the legs small and weak, and it differs from nearly every other crab in having a perfectly soft yielding skin. In fact, it was always a "soft-shelled crab."

In the large "blue claw" crabs of our coast the carapace, or shield which covers the body, is hard and firm, the legs and especially the pincers extremely rigid. On examination we find that this shell is made up of a fine hornlike skin, in which has been deposited a quantity of lime salts, making its covering almost as hard as marble. As the crab grows in size this armor, not being able to grow with the crab, is thrown off, while there is formed just under it a new soft skin. The shell cracks open, allowing the crab to crawl out of its old clothes, and for a day or two it is in a very helpless condition. It is at this time that they are captured and sold in our markets as "soft-shelled crabs." However, it is not long before the soft skin becomes as hard as it ever was, but during this period the crab is a very quiet, modest, and retiring fellow. He retires from the sight of the world as much as possible, and when his skin becomes hard again, like some persons under similar conditions, he sallies forth making himself very disagreeable to those who differ from him. The little oyster crab is in this sensitive thin skinned condition throughout its whole life, and consequently always keeps hidden within the protecting shells of some bivalve. This state of affairs is a good example of the law of use and disuse which we find so widely spread in the animal kingdom. When an organ or any part of an animal is not properly exercised, or becomes useless to its possessor, nature allows it to dwindle away and in time to disappear. One of these *Pinnotheres*, which lives, not in any shell fish, but deep away in the water lungs of a sea cucumber, is during the whole period of its adult life in total darkness; it loses its eyes and is totally blind—as blind, and for the same reason, as the blind fish of Mammoth Cave. The eyes being of no use in its dark abode, they degenerate and disappear; so it is with those crabs which are so well protected from their enemies by the hard shells of their hosts; they

never get hard skins, but remain always soft and transparent. Now, how does the crab get in, and does it ever get out of its shelly home? The crab gets into its future residence at a very early period of its life, when, indeed, it looks so unlike its parent that one would not believe that any relation existed between them. When the eggs of crabs are hatched a curious little object comes forth, known to naturalists as a zoëa, and they speak of this period as the "zoëa stage." This form is so unlike any known crab and always found freely swimming in the water, and never on the bottom, that when it was first discovered it was supposed to be an adult animal, and was named zoëa. By raising crabs from the egg it was found that this zoëa was only the childhood of nearly every crab or lobster, and as it grew and shed from time to time its transparent skin, it gradually came to look more and more like its parent. By the discovery that the eggs of barnacles passed through stages common to most crab-like animals, naturalists found that they did not belong to that great group including the snails, clams, and cuttlefish, where they had been placed prior to 1829, but belonged to the group which includes crab, lobster, and shrimp-like animals, but greatly modified in the adult state to suit their habits and surroundings. The tiny zoëa, not larger than a pin's head, leads for a time a perfectly free life in the water, swept hither and thither by the currents of the sea; as it gets older it finds its way to some open oyster and then it is swept within its shell by the current of water which passes over the gills and on to the mouth. It here gives up its wandering life and soon grows to the adult form, shedding from time to time, as with all crabs, its transparent skin. We find, moreover, that it is only the female which lives in the oyster. The male zoëas do not remain thus protected, but prefer the freedom of a life on the ocean bottom, only visiting its mate in the oyster at certain seasons of the year. This male form is not soft, like its well housed mate, but, as we would suppose from its free life, has a fairly hard shell, like other crabs.

The *Pinnotheres* are found all over the world, wherever we find oysters, mussels, or scallops, from the Antarctic Ocean to the frozen North; but it seems that they are only used as a table delicacy by the American people. In the West Indies there is an oyster which attaches itself to the long roots of the mangrove trees. When Columbus first saw them he was greatly astonished to find among the many wonders of the Western world, oyster bearing trees, and having read that pearls were formed in oysters by drops of dew falling into their open mouths, reported to the credulous Europeans that the mangrove oyster must yield

an abundant harvest, for the dew was so heavy in these tropical islands. Dr. Patrick Browne, however, tells us in 1756 that the oyster crab is very common in the mangrove oyster, and such "as eat them do not think them a bit the worse for being accompanied with some of these crabs, which they swallow with the (shell) fish."

These crabs are quite common in the true pearl oysters of the Indian and Pacific Oceans, and there is a specimen of one of these shells in which a male is imprisoned in the substance of the shell and covered over with a layer of mother-of-pearl. The little fellow probably entered the oyster in search of his mate, and, not finding her, wandered about and at length passed between the mantle of the oyster and the shell, where he was finally enshrouded in mother-of-pearl. There are about 75 kinds of crabs belonging to the oyster-crab family, all more or less related. All of them are small and of a retiring disposition. Some do not live within the shells of a protecting bivalve, but remain on the sea bottom under stones and hidden within small holes. Naturalists can, by the study of these animals, trace the different steps from the free crab, hiding in holes and crevices, to those which enter the open mouths of oysters, where, being protected from the attacks of enemies and having its food brought to it by the exertions of its host, it spends its entire life.

But perhaps the most curious habit found in any crab is that of a near relation of the oyster crab, which we may call the "coral crab." This very small animal, after the free zoëa life common to most crabs, settles down in the fork of a growing coral and waits for a home to be built up around it. As the coral grows, the crab is slowly surrounded by the hard skeleton of the polyps. A very wonderful equilibrium is now formed. The crab must grow just as fast and no faster than the coral, for if it did not keep pace with the growth of the coral it would be soon walled in and no room allowed for its future growth. So, till the crab has reached its full size, about one-quarter of an inch, it lies in a cup-shaped hollow, with its opening on a level with the coral polyps. When the full growth of the crab has been attained, the coral polyps would now certainly close in over the little crab, and make it a prisoner, as did the pearl oyster, but the currents of water made by the crab in breathing force the polyps to grow slanting from the mouth of her cave, so that in time a long funnel-like opening leads past the growing polyps to the body of the little crab. We have here a beautiful adaptation. The crab chooses its own place among the coral branches, and then gently forces the workmen to build it a safe and comfortable home.

BENJAMIN SHARP.

Ozæna, a discharge of fetid, purulent, or sanious matter from the nostrils. It is a symptom rather than a disease, and may arise from ulceration of the membrane lining the nostrils, or from caries of the adjacent bones, and may accompany syphilitic, scorbutic, scrofulous, or cancerous affections of these or adjacent parts.

Ozaka. See OSAKA.

Ozaneaux, Jean George, a French writer of prose and verse; born in Paris, France, in 1795. He wrote a "History of France" (1846), which gained a prize from the Academy; and "Poetic Errors" (1849). He died in 1852.

Ozark Mountains, a chain of the United States, intersecting in a S. W. direction the States of Missouri and Arkansas; height about 1,400 feet.

Ozokerite, Mineral Wax, or Ceresin, a valuable mineral found in large deposits in Utah and in the Austrian province of Galicia. It is impossible to enumerate all the uses to which ozokerite may be put. As the rival of beeswax it has already reduced the price of that product from 40 to 25 cents a pound, and this reduction will be increased as the cost of producing ozokerite decreases. But ceresin possesses many valuable qualities not found in other wax. Its melting point is high—from 155° to 190° F.; it is plastic without being soft, and hard without brittleness; it is decolorized without destructive distillation; alkalis and the strongest acids make no impression on it, and when refined it is odorless and tasteless. It is used for the insulation of electric wires. It is valuable for all kinds of water proofing, and papers waxed with it are being largely used in wrapping soaps,

steels, books, and all kinds of articles that require protection from moisture. Boxes, tubs, barrels, and kegs lined with it are perfectly tight, and impart no unpleasant flavor to the contents, even if they are the most delicate mineral waters. The ozokerite permeates the pores of the wood instead of merely giving it a surface coating. Ozokerite is also used in lining iron tanks in which powerful acids are to be mixed. It is estimated that three-fourths of the candles used in the churches of this and other countries are made of ozokerite or of beeswax strongly adulterated with ozokerite. The illuminating power of such candles is stronger than that of others, while they drip but little, and never lop over when subjected to ordinary atmospheric heat. All wax figures and wax dolls are made of ozokerite, which also enters largely into the manufacture of imitation alabaster statuettes, and the elaborate decorations which sometimes adorn wedding cakes and other confections. Among other uses to which it is put are the making of liniments, salves, and plasters, sealing-wax, wax matches, life-preservers, boot blacking, varnishes, shoemaker's wax, and all kinds of lubricants.

Ozone, in chemistry, a modification of oxygen existing as a triatomic molecule. It is nearly always present in the atmosphere, apparently as the result of electrical action, and is formed by passing electric sparks into dry air. It possesses a peculiar, almost metallic, odor, and seems to have all the properties of oxygen, in an enhanced degree. It liberates iodine from iodide of potassium, and Schönbein, who named it, has used this reaction for its detection in the atmosphere.



P, the 16th letter and the 12th consonant of the English alphabet is a labial sound, formed by a compression of the anterior part of the lips, as in pull, papa, ap. As a sharp labial it is classed with *f*, and corresponds to the flat labial *b*. *P* has but one sound in English, except when in combination with *h* it forms the digraph *ph*, which is sounded as *f*, and occurs in words derived from the Greek. In the case of many words derived from the Greek, initial *p* is not sounded, as in pneumatics, psalm, psalter, pterodactyl. It is sometimes, but rarely, silent in the middle of a word, as in receipt. *P* represents an original *b* in gossip (Middle English *godsib*), purse (Old French *borse*, Latin *bursa*), apricot (French *abricot*). An original *p* is represented by *b* in lobster (Middle English *loppestre*), cobweb (Middle English *copweb*), and by *v* in knave (Middle English *cnapa*). *P* is often found inserted between *m* and *t*, as in empty (Middle English *emtig*), tempt (Old French *tenter*, Latin *tento*). As an initial: *P* represents the Latin *post* = after; as *p. m.* = *post meridiem* = after noon; *p. s.* = postscript, etc.; in music written for the piano = softly.

As a symbol, *P* was formerly used: In numerals: To denote 100, and with a dash over it, to denote 100,000.

Paalstab. See PALSTAVE.

Paalzov, Henrietta Joanna Wach von (pä'l'zof), a German story-writer; born in Berlin, Germany, in 1788. Among her stories are: "Godwin Castle" (1837); "Saint-Roche" (1839); "Thomas Tyrnau" (1842); "Jakob von der Nees" (1842). Her plots are very skillfully contrived and elaborated. She died in Berlin in 1847.

Paban, Adolphe (pä-böng'), a French poet and story-writer; born in Combs-la-Ville, department Seine-et-Oise, France, Nov. 13, 1839. He published three volumes of "Poems" (1859-1862); "Inspirations"

(1868); "Fanciful Sonnets" (1871); "A Drama in a Garden," a story in prose (1874).

Paca, in zoölogy, *Cælogenys paca*, a rodent of the family *Dasyproctidæ*. It is about two feet long, brown, or yellowish-



PACA.

brown above, with from three to five bands of white streaks or spots on each side; white beneath. Habitat, Central and South America, from Guatemala to Paraguay. It resembles the agouti in habits. It lives singly or in pairs, passing the day in a hole at the root of some tree, or in a burrow. It is a vegetable feeder. The flesh is well flavored, and is eaten by natives and Europeans.

Paca, William, an American statesman; one of the signers of the Declaration of Independence; born in Wyehall, Harford Co., Md., Oct. 31, 1740; Governor of Maryland in 1782-1785; died in Wyehall in 1799.

Pacajas, an Indian tribe of the lower Amazon, which formerly occupied much of the mainland on both sides of the island of Marajo. They were agriculturists and lived in large villages. They do not exist now as a separate tribe.

Pacay, a Peruvian tree (*Prosopis dulcis*), natural order *Leguminosæ*, sub-order *Mimosæ*. The pure white, flaky matter in which the seeds are embedded is used as

food, and the pods, which are nearly two feet long, serve for feeding cattle. The mesquite belongs to the same genus.

Pacayas, an Indian tribe of Northeastern Peru and Brazil on the Javary river.

Pace, a step; a single change of the foot in walking, or manner of walking; gait, walk. Also a linear measure, representing the distance traversed by the foot from the place where it is taken up to that where it is set down in walking; it is variously estimated at 4 2-5 to 5 feet. The military pace of a single step is 2½ feet. The old Roman pace (*passus*) contained 5 Roman feet, each of about 11.64 English inches, and was, therefore, equal to about 58 English inches: A particular movement or mode of stepping which horses are taught, in which the legs on the same side are lifted together; an amble. A dais; a portion of a floor raised above the general level; a platform. A drove of asses.

Pacer, one that paces; a horse trained in pacing.

Pachacama, a town and temple of ancient Peru, on the coast, about 20 miles S. of Lima. In this temple worship was paid to Pachacama, which was the name given by the Peruvians to the Supreme Deity, or "founder of the world." The ruins of the building, which was very extensive, are still existing and are of an older type of architecture than that of the Incas. The shrine and wooden image of the god were destroyed by Pizarro in 1523.

Pacheco, Francisco, a Spanish painter; born in Seville in 1571. He was the pupil of Luis Fernandez, and the instructor of Velasquez, who became his son-in-law. In his own time he attained great popularity. Of his numerous portraits those of his wife and of Cervantes were the most admired. Pacheco was the author of a treatise on the "Art of Painting." He died in 1654.

Pachira, in botany, a genus of *Bombacæ*, akin to *Adansonia*. *P. (Carolinea) alba* is a South American tree, the inner bark of which furnishes excellent cordage. *P. macrantha* is a large tree, 100 feet high, with greenish flowers and blood-red filaments.

Pachmann, Vladimir de, a Russian pianist; born in Odessa, Russia, July 27, 1848. He studied under his father, who was a violinist of some talent, and was also a pupil of Dachs at Vienna. His first appearance was in 1869, and in 1871 he began his tours. He attained a high reputation both in Europe and in the United States, especially as an interpreter of Chopin.

Pachomius, an Egyptian monk of the 4th century, the first to substitute for the free asceticism of the solitary recluse a

regular cœnobitic system. He was born about 292, and about 340 founded the first monastic institution at Tabenna, an island in the Nile, where ere long there were as many as 1,400 monks. He also established the first convent for nuns, which was under the presidency of his sister, and he labored with so much diligence and zeal that at his death, according to Palladius, not fewer than 7,000 monks and nuns were under his inspection.

Pachydermata, an order of Mammalia, founded by Cuvier, for hoofed non-ruminant animals with thick integuments. He divided it into three groups, Proboscidea, Ordinaria, and Solidungula. The first division is now raised to ordinal rank, and contains the elephants; the others are grouped in one order, *Ungulata*. To these two orders Professor Huxley has provisionally added a third, *Hyracoidea*.

Pachyglossæ, a section of saurian reptiles having a thick fleshy tongue, convex, with a slight nick at the end. It includes the iguanas and agamas.

Pachyrhizus, a genus of typical *Phaseoleæ*, consisting of twining plants with violet-blue papilionaceous flowers. It is a native of the East and West Indies, Fiji, etc. It is cultivated in India for its tuberous roots, six or eight feet long, and as thick as a man's thigh. They are eaten, especially in time of scarcity, either raw or boiled. In the latter case they resemble turnips.

Pacific, University of the, a coeducational institution in San José, Cal., founded in 1852 under the auspices of the Methodist Episcopal Church; has grounds and buildings valued at over \$200,000; endowment, about \$125,000; scientific apparatus, etc., \$5,000; volumes in the library, 10,000; ordinary income, \$40,000; average number of faculty, 32; average student attendance, 325; graduates, over 650.

Pacific, War of the, a name usually given to the war by Chile against Bolivia and Peru in 1879-1883. Many battles were fought on sea and land in which the Chileans were, as a rule, victorious. They captured the city of Lima, Jan. 17, 1881. A treaty of peace between Chile and Peru was signed at Ancon, Oct. 20, 1883, and ratified April 4, 1884. A treaty of peace between Chile and Bolivia was signed Dec. 11, 1883. By these treaties all the coast region of Bolivia and Tarapaca in Peru were permanently ceded to Chile. The Chileans evacuated Lima Oct. 20, 1883. See BOLIVIA: CHILE: PERU.

Pacific Ocean, the largest of the five great oceans, lying between America on the E., and Asia, Malaysia, and Australasia on the W. The name "Pacific," given to it by Magellan, the first European navigator who traversed its wide expanse, is

Pacific Ocean

doubtless very appropriate to certain portions of this ocean; but, as a whole, its special claims to the epithet are, at the least, doubtful, though the name has by long usage become too well established to be easily supplanted by any other. The greatest length of the Pacific Ocean from the Arctic (at Bering Strait) to the Antarctic circles is 9,200 miles, and its greatest width, along the parallel of lat. 5° N., about 10,300 miles; while its area may be roughly estimated at about two-fifths of the whole surface of the earth. Its surface is studded with numerous islands, either scattered or in groups. The deepest sounding yet found in the Pacific Ocean is 26,850 feet, or about 5 miles—nearly equal to the height of the highest mountain on the globe. The coasts of the Pacific Ocean present a general resemblance to those of the Atlantic, and the similarity in the outline of the W. coasts of each is even striking, especially N. of the equator; but the shores of the former, unlike those of the latter, are sinuous, and, excepting the N. E. coast of Asia, little indented with inlets. The shore on the American side is bold and rocky, while that of Asia varies much in character. Though the Pacific Ocean is by far the largest of the five great oceans the proportion of land drained into it is comparatively insignificant. Its basin includes only the narrow strip of the American continent to the W. of the Andes and Rocky Mountains; Melanesia, which contains few rivers, and none of them of large size; the Indo-Chinese States, China proper, with the E. part of Mongolia, and Manchuria in the Asiatic continent.

In Polynesia, especially near the New Hebrides group, hurricanes are of frequent occurrence from November to April, but they exhibit few of the terrible characteristics which distinguish the hurricanes of the West Indies and Indian Ocean. N. and S. of the tropical zone the winds exhibit little periodicity, being found to blow from all parts of the compass at any given season of the year, though a general W. direction is most frequent among them. On the coast of Patagonia, and at Cape Horn, W. winds prevail during the greater part of the year, while in the sea of Okhotsk they are of rare occurrence. The frightful typhoon is the terror of mariners in the Chinese seas, and may occur at all seasons of the year. There are many other winds and storms, such as white squalls, cyclones, "tempestades," etc., which are confined to particular localities. The currents of the Pacific Ocean, though less marked in character and effects than those of the Atlantic, are yet of sufficient importance to require a brief notice. The Southern Pacific current takes its rise S. of Van Dieman's Land, and flows E. at the rate of half a mile per hour, dividing into two branches about lon.

Pacific Railroads

98° W., the N. branch, or Current of Mentor, turning N. and gradually losing itself in the counter Equatorial Current; the S. branch continuing its E. course till it is subdivided by the opposition of Cape Horn into two branches, one of which, the cold Current of Peru, or Humboldt's Current, advances N. along the W. coast of South America, becoming finally absorbed in the Equatorial Current; the other washing the coast of Brazil, and becoming an Atlantic current. The existence of this ocean first became known to Europeans through Columbus, who had received accounts of it from some of the natives of America, though it was first seen by Balboa, Sept. 29, 1513, and first traversed by Magellan eight years afterward. Captain Cook deserves the first place among the investigators of the Pacific Ocean; and after him come Anson, the two Bougainvilles and La Perouse.

Pacific Railroads, a general name given to all the railroads connecting the Pacific coast of the United States with other parts of the country, to which the aid of the National government was given in their construction. As early as 1846 the plan for thus uniting the extreme sections of the United States had been proposed, but it was not till 1855 that active steps were taken and surveys were made. In 1860 both the great political parties agreed in recommending that the government give substantial aid to the project. In 1862 an act was accordingly passed, granting to the companies five sections of public land and \$16,000 in government bonds for every mile constructed, the land and bonds for every stretch of 40 miles to be turned over to the company only on the completion of such stretch. The grants of bonds varied, some being as high as \$48,000 a mile in the most difficult parts of the route. On the part of the companies, all transportation, or other service performed for the government, was to be applied for its reimbursement for the principal and interest of the bonds so issued. Meanwhile the bonds were to be a first lien on all the property of the company. In 1864 some changes were made in these provisions. The grant of land was increased from 5 to 10 sections. The requirement of 40 miles completed track before bonds and land on any part of it were granted, was reduced to 20 miles, and the company was authorized to issue bonds not exceeding the amount of government bonds, the mortgage of the latter in favor of the government to be postponed to that of the new bonds; moreover it was provided that only one-half of the value of the company's services to the government was to be retained to extinguish the debt, the other half was to be paid in cash to the company. The Union Pacific railroad was built W. over the mountains, and the Central Pacific railroad was built E. from Sacramen-

to. These two lines were joined, with impressive ceremonies, at Promontory Point, Utah, May 10, 1869. The last tie, of laurel wood, with a plate of silver upon it, was laid, and the last spike, made of iron, silver, and gold, was driven in the presence of distinguished men. The officers of the road, and a large concourse of visitors from East and West were present. Telegraph wires were attached to the last rail, and the last blows were signaled upon bells in Washington and other large cities. In many places large crowds had gathered to receive the first intimation conveyed almost instantaneously over the electric wires, that the great work was complete. When the signal was received in San Francisco and elsewhere all the church bells were rung, and cannon were fired.

In May, 1878, an act, known as the Thurman Act, was passed, prescribing more stringent terms for the repayment of government advances. In addition to the amounts retained out of sums due for government service, the Act of 1862 provided for the payment of 5 per cent. of the net earnings of the company. The Act of 1878 retained the entire amount due to the companies for government service, one-half to be applied to interest payments, one-half to form a sinking fund for the principal, and it required, moreover, the annual payment of a fixed sum (\$850,000 for the Union Pacific and \$1,200,000 for the Central Pacific), or so much thereof as might be necessary to make the total obtained by adding the 5 per cent. of net earnings and the whole of the compensation retained, equal to 25 per cent. of the net earnings.

Pacific University, a coeducational institution in Forest Grove, Or.; founded in 1853 under the auspices of the Congregational Church; has grounds and buildings valued at over \$30,000; aggregate productive funds, about \$250,000; volumes in the library, 15,000; ordinary income, about \$40,000; average number of faculty, 30; average student attendance, 240; graduates since opening, over 225.

Pacini, Giovanni, an Italian composer; born in Syracuse, Sicily, Feb. 11, 1796. Among the 80 operas which he wrote, the best known are "Niobe" (1826); "Sapho" (1840); "Medea" (1843); and "Queen of Cyprus" (1846). He founded a music school at Viareggio, but subsequently made his home in Lucca, where he taught a number of pupils who afterward became famous. He died near Peschia, Dec. 6, 1867.

Pacinian Bodies, or **Pacinian Corpuscles**, certain corpuscles appended to the nerves; first noticed by Pacini in 1830 and 1835, and described by him in 1840. In the human subject they are found in great numbers in connection with the nerves of

the hand and foot, the nerves, as it may be presumed, of touch; but they also exist sparingly on other spinal nerves, and on the plexuses of the sympathetic, though never on the nerves of motion. They consist first of a series of membranous capsules, from 30 to 60 in number, enclosed one within the other, and secondly of a single nervous fiber of the tubular kind enclosed in the sheath, and advancing from the central capsule, which it traverses from end to end.

Packard, Alpheus Spring, an American naturalist; born in Brunswick, Me., Feb. 19, 1839; was graduated at Bowdoin in 1861; and was for a time assistant to Agassiz at Cambridge. He took part in several scientific expeditions, was State Entomologist of Massachusetts in 1871-1873, and lectured at Bowdoin and elsewhere. In 1878 he became Professor of Zoölogy and Geology at Brown University. He is best known as an entomologist; his classification of insects, proposed in 1863, has been generally accepted. As an evolutionist, Professor Packard was one of the leaders of the Neo-Lamarckian school. Besides popular works and text-books, his writings include "Structure of the Ovipositor of Insects" (1868); "Development and Anatomy of *Linulus Polyphemus* (1871-1885); "The Cave Fauna of North America" (1888); "The Labrador Coast" (1891); "Text-book of Entomology" (1898); "Lamarck" (1891); monographs on the geometrid moths, the locust's brain, etc. He died Feb. 27, 1905.

Packard, Frederick Adolphus, an American lawyer, editor, and author; born in Marlboro, Mass., Sept. 25, 1794. He was editor of the publications of the American Sunday-school Union for nearly 40 years. Among his important works are: "The Union Bible Dictionary" (1837); "The Teacher Taught" (1839); "Life of Robert Owen" (1866). He died in Philadelphia, Pa., Nov. 11, 1867.

Packer, Asa, an American capitalist and philanthropist; born in Groton, Conn., Dec. 20, 1806; was a member of the Pennsylvania Legislature, county judge, projector of the Lehigh Valley railroad, etc. He became the richest man in Pennsylvania. He served two terms in Congress. Lehigh University was liberally endowed by him. He died in Philadelphia, Pa., May 17, 1879.

Packfong, a Chinese alloy of a silver-white color, consisting (though different accounts are given of its composition) of copper, zinc, nickel, and iron. It was formerly used by watch makers, mathematical instrument makers, and others, for a variety of purposes for which nickel alloys are now employed.

Pack Ice, the collection of broken floe, which, huddled together under pressure, is constantly varying in its position.

Pactolus

Pactolus, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the N. slope of Mount Tmolus (modern Buz Dag) flows N. past Sardis (Sart), and empties itself into the Hermus (Kodus). It is never more than 10 feet broad and 1 foot deep. The sands or mud of Pactolus were long famous in antiquity for the particles of gold dust which they contained. The collection of these particles, according to legend, was the source of Cræsus' vast wealth. The brook is now called Sarabat.

Pactum Illicitum, in Scotch law, a term applied to all contracts opposed to law, as being either *contra legem* (=contrary to law), or *contra bonos mores* (=opposed to or inconsistent with morality or sound policy).

Paddle Fish, the *Polyodon spatula*, a large fish allied to the sturgeons, so named from the elongated broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 feet. The paddle fishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of that continent.

Padella, a small frying-pan; an oven. Also a cup or saucer of metal or other earthenware, containing oil or fatty matter, in which a wick is set for illuminations.

Paderborn, a town of Westphalia, Prussia; 50 miles S. W. of Hanover. The fine Romanesque cathedral (R. C.), completed in 1163, is built over the sources of the Pader (a tributary of the Lippe), and contains the silver coffin of St. Liborius. Other noticeable edifices are St. Bartholomew's Chapel (1017) and the town house (1615; restored 1870-1876). There are miscellaneous manufactures here; and there are mineral springs close by. The old Hanse town was sacked by the Duke of Brunswick in 1622, and it suffered much during the Thirty Years' War. From 1614 to 1819 it was the seat of a Roman Catholic university. Much of it was burnt down in 1875.

Paderewsky, Ignace Jan, a Russian pianist; born in Podolia, Russian Poland, Nov. 6, 1860. At seven his father placed him under the care of a teacher, Pierre Sowinski. In 1872 he went to Warsaw, where his knowledge of harmony and counterpoint was acquired from Roguski, and later from Frederick Kiel, of Berlin. At 18 he was nominated Professor of Music to the Warsaw Conservatory. In 1884 he held a professorship at the Conservatory of Music in Strasburg, but he resolved upon the more fascinating career of a pianistic virtuoso. Paderewsky accordingly removed to Vienna, placed himself under Leschetizky, and made his début before the Viennese public in 1887, and was at once proclaimed to be one of the

Paducah

most remarkable pianists of the day. From this date he paid several visits to the principal towns throughout Germany, always with increasing success, and in 1889 made his first appearance before a Parisian audience. He visited the United States four times. He composed more than 80 vocal works, a concerto in A minor for piano and orchestra, an opera "Manfred," a suite for orchestra in G, and many pieces for the piano. His "Polish Fantasia" was produced at the Norwich Festival in 1893.

Padilla, Juan Lopez de, a popular Spanish hero; born in Toledo in 1484, of a noble family; was a leader in the insurrection of the Castilian towns (the so-called Comunidades) against the arbitrary policy and Flemish advisers of Charles V. The fate of the insurrection was decided by the battle of Villalar, in which Padilla was wounded and taken prisoner. He was executed on the following day, April 24, 1521. His wife, Maria Pacheco, defended Toledo for some time after his death, and on its fall fled to Portugal. The names of Padilla and his wife are still household words among the Castilians.

Padilla, Pedro de, a Spanish poet; born in Linares, Spain. He was a friend of Cervantes, and a notable improvisator. He renounced the world in his old age and became a Carmelite friar (1585). His works consist of lyric and bucolic poems, satires, spiritual songs, and metrical romances; some of them, especially the eclogues, are among the best of their time. His poems were published under the titles: "Treasury of Various Poems" (1575); "Pastoral Eclogues" (1581); "Romances" (1583); "Spiritual Garden" (1585); "Grandeurs and Excellencies of the Virgin Our Lady" (1587). He died about 1595.

Padishah, or Padisha, the title of the Sultan of Turkey and of the Shah of Persia.

Padua (ancient Patavium), a fortified city of Italy, province of Padua, at the junction of the Brenta and Bacchiglione, 24 miles W. of Venice. Its celebrated university, founded in the 13th century, had in former times students from all parts of the world. Among these were Dante, Petrarch, and Tasso; and among the professors were Fallopius, Fabricius ab Aquapendente, Morgagni, Galileo, and Guglielmini. In 1897-1898 it had 71 official teachers and 1,588 students and auditors. The university library comprises 100,000 volumes. There is also an academy of sciences. The churches, and especially San Antonio, are less remarkable for architecture than for their paintings and interior decorations. Manufactures woollens, silks, ribbons, and leather. Pop. (1909) 82,281.

Paducah, a city and county-seat of McCracken co., Ky.; at the confluence of the Ohio and Tennessee rivers, and on the Nash-

ville, Chattanooga, and St. Louis, and the Illinois railroads; 48 miles N. E. of Cairo, Ill. It contains a court house, high school, United States Government Building, the Illinois Central Railroad Hospital, waterworks, electric light and street railroad plants, Paducah University, National and State banks, and several daily and weekly newspapers. There are manufacturing factories of chairs, furniture, tobacco, farming implements, etc. It also has a ship-building plant, tobacco warehouses, and tobacco factories, and an assessed property valuation of about \$7,000,000. Pop. (1890) 12,797; (1900) 19,446; (1910) 22,760.

in 1795, became chapel-master to the Elector of Saxony six years later, and after the battle of Jena, entered the service of Napoleon. He spent the rest of his life at Paris, and from 1818 till 1825 held the office of Director of the Italian Opera. He was a member of the Academy of the Fine Arts. His most successful productions were the operas of "Griselda," "Agnese," "Camilla," and "Achille." He died in 1839.

Paes, or Paezes, an Indian tribe living in the mountains of Colombia. They were formerly a powerful, warlike tribe now reduced to about 2,000. They live in villages



TEMPLE OF CERES, PÆSTUM.

Pæan, in classical mythology, a name given to Apollo. Also the ancient choral song addressed to Apollo, named after its burden (Greek *io paian*). It was sung sometimes before battle, and sometimes after a victory. Donaldson thinks it probable that it was at first accompanied on the phorminx, which, however, was afterward superseded by the flute. From the ancient pæan sprang the gymnopædic, pyrrhic, and hyporchematic dances. Also a song of triumph or rejoicing.

Paer, Ferdinando, an Italian composer; born in Parma in 1774. He studied at Venice, was called to the court of Vienna

and follow agriculture and though inhabiting a cold region wear few clothes.

Pæstum, an ancient city of Lucania, in Southern Italy, in the N. W. extremity of that province, about 4 miles S. E. from the mouth of the Silarus (Selo), and upon a bay of the Tyrrhenian Sea, called Sinus Pæstanus (now Gulf of Salerno). It was a place of importance and great beauty in the time of the Romans, and renowned for the splendid roses grown in its neighborhood, which bloomed twice a year. Several magnificent remains of its former grandeur are still standing, and attract universal attention.

Paez (pa-êth'), **Jose Antonio**, one of the founders of South American independence; born of Indian parents near Acarigua, Venezuela, in 1790. He entered the patriot army in 1810, rose to general of division in 1819, and took a leading part in the battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He spent the latter part of his life in the United States. He died in exile in New York, May 7, 1873.

Pagan (Latin, *pagus* = a village), a heathen, an idolater; one who worships idols or false gods (applied to one who is not a Christian, a Jew, or a Mohammedan). The last use of the word dates from the 4th century. Trench says that the first use of the word in this sense is in an edict of the Emperor Valentinian A. D. 368. Christianity was first preached in the large towns, and partly on this account and partly from the greater proneness of the people of cities to adopt new opinions, it rooted itself at the great centers of population before greatly affecting the country parts; the cities were then Christian, while the country people were heathen, and the word *paganus* = a villager, consequently became synonymous with heathen.

Paganini, Nicolo, an Italian violinist; born in Genoa in 1784; was initiated into the principles of music by his father, who was a great musical amateur. His first public engagement was at Lucca. Here he found a zealous patroness in the Princess Bacchiochi, sister of Napoleon; but in 1813 he left Lucca for Milan. From this period dates his wondrous performance on a single string, which at a later period called forth such bursts of applause from numerous audiences in Germany, France, and England. In 1828 he visited Vienna, where he met with an enthusiastic reception. Thence he visited the chief cities of Germany; and in 1831 he made a musical tour through France and England, where he realized enormous sums, which, however, the gambling table swallowed up, frequently even with a greater rapidity than he gained them. His last years were spent at his villa Gajona, near Parma. He died in Nice in 1840.

Paganism, the state or condition of a pagan; heathenism; the worship of idols or false gods, used specially of that of ancient Rome. Licinius having made war against Constantine, A. D. 314, and again in 324, after the conversion of the latter to Christianity, was supported by the good wishes and the power of the pagan priests.

Constantine believed that paganism was a danger to the throne, and began to discourage it. In 331 he ordered the destruction of the pagan temples throughout the Roman empire. Julian, in 361, began to rebuild them, but the work ceased with his death. In 385 Theodosius I. issued an edict against pagan sacrifices, and soon afterward closed the temples and the shrines. In 388 the Roman Senate renounced paganism, and in 391 it was legally abolished through the whole Roman empire, and afterward gradually died away. In Germany the term is applied to tendencies in the Christian Church which are deemed polytheistic in nature.

Page, a youth attached to the service of a royal or noble personage, rather for formality or show than for servitude. The name "pages" appears to have been confined to slaves and attendants of an inferior class, in modern Europe, till the reigns of Charles VI. and Charles VII. of France. As chivalric institutions prevailed, the office, by whatever name it may be called, became of importance. Courts and castles were the schools in which the young noble passed through the degree of page, in order to reach the higher grades of esquire and knight, when he became *hors de page*. In the 16th century the chivalrous character had become much adulterated; but the custom of bringing up sons as pages at courts continued till the disorder and license of the age rendered the service so dangerous that it was no longer sought by the better classes as a mode of education for their children. Pages then became, as they are now, mere relics of feudal customs; from almost all courts they have entirely disappeared; but are still to be found in the household of the Queen of Great Britain, with the title of "Pages of the Presence" etc. The word is also applied to messenger boys in National, State, and municipal legislative bodies.

Page, Thomas Jefferson, an American naval officer; born in Shelley, Gloucester co., Va., Jan. 4, 1808. In 1853-1856 he was lieutenant-commander in explorations in South America. He resigned in 1861 and entered the Confederate service. He was commissioned commodore and in 1862 was sent to England to take charge of a cruiser. Not being allowed to take the ship out he secured the command of a small iron-clad at Copenhagen, which was taken from him while in a Spanish port. He then left the service and subsequently resided in the Argentine Republic and in Florence, Italy. He was the author of "La Plata, the Argentine Confederation, and Paraguay" (1859). He died in Rome, Italy, Oct. 26, 1899.

Page, Thomas Nelson, an American novelist; born in Oakland, Va., April 23, 1853. He was



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educated at Washington and Lee University, and practised law at Richmond, Va. His first story, "Mars Chan" (1887), attracted immediate attention and was widely read. He wrote: "Two Little Confederates" (1888); "On New-Found River" (1891); "Elsket and Other Stories" (1891); "The Old South" (1892); "Pastime Stories" (1894); "Unc' Edinburgh" (1895); "Social Life in Old Virginia" (1897); "Santa Claus' Partner" (1899); "A Gentleman of the Old Stock"; etc.

Page, William, an American artist; born in Albany, N. Y., Jan. 23, 1811. When a boy he studied art under James Herring and Samuel F. B. Morse, and at the Academy of Design. He resided in Florence and Rome for 11 years. In 1836 he was elected a member of the National Academy and was the society's president in 1871-1873. He made many experiments in art methods and coloring. An especial admirer of Titian, he strove to discover the secrets of that master's art, and painted an imitation so admirable that one of them deceived even the Florentine authorities, who seized it as an original. He painted portraits of John Quincy, the Brownings, Charlotte Cushman, and many other notables. His most famous paintings are "The Holy Family" (1837); "The Last Interview" (1838); "Ruth and Naomi" (1880); and a full-length painting of Admiral Farragut, which was purchased and presented to the Emperor of Russia. He died in Tottenville, Staten Island, N. Y., Oct. 1, 1885.

Paget, Francis Edward, an English story-writer, born May 24, 1806. His most important work is a compilation of "Some Records of the Ashstead Estate" (1873). His stories deal with Church and social reform; among them are: "Caleb Kniverton, the Incendiary" (1833); "Milford Malvoisin; or, Pews and Pewholders" (1842); "The Curate of Cumberworth and the Vicar of Roost" (1859). He died Aug. 4, 1882.

Paget, Sir George Edward, an English physician; born in Yarmouth in 1809; was

educated at the Charterhouse and at Cambridge. He took his B. A. degree in 1831, became Fellow of Caius in 1832, M. D. in 1838, D. C. L. Oxford and Durham, LL. D. Edinburgh, and F. R. S. in 1855. In 1872 he was appointed regius Professor of Physic in Cambridge and became K. C. B. in 1885. Sir George may well be regarded as a public benefactor, he having taken the principal part in the great advance made in the education of medical practitioners. He died in 1892.

Paget, Sir James, an English surgeon, younger brother of Sir G. E. Paget; born in Yarmouth, in 1814. He became member of the Royal College of Surgeons in 1836, fellow in 1843, member of the council in 1865, president of the college in 1875, Bradshawe Lecturer in 1882. Serjeant-surgeon to the queen, surgeon to the Prince of Wales, and consulting surgeon to St. Bartholomew's Hospital, he was created baronet in 1871, and in the same year LL.D. of the University of Edinburgh. Two standard works are "Lectures on Surgical Pathology" (1853; 4th ed. 1876), and "Clinical Lectures" (1875). He was vice-chancellor of the University of London, and a member of the Institute of France. He died Dec. 30, 1899.

Paget, Violet. See LEE, VERNON.

Paging Machine, in printing, a machine for giving the consecutive numbers to the pages of an account or blank book.

Pago Pago, a harbor in the island of Tutuila, Samoa. It is a long L-shaped expanse of water, extending mostly in an E. and W. direction, and surrounded by tall, almost precipitous cliffs, that run up into peaks from 2,000 to 3,000 feet high. These are densely covered with the greenest foliage. Below the bay is deep and somber, edged with coral reefs dark with the life of the sea, with here and there patches of white, over which the water is as a soft veil of green, with deeper depths of blue.

The harbor was ceded to the United States for a naval and coaling station, first in 1872, and afterward confirmed by a treaty signed in Washington, Jan. 17, 1878, and ratifications exchanged on Feb. 13 of the same year, by which the United States was given the right to establish at that harbor a station for coaling, naval supplies, freedom of trade, commercial treatment as a favored nation, and extra-territorial consular jurisdiction. This harbor was occupied by the United States in 1898, with the purpose of utilizing its advantages as a coaling and supply station. Tutuila, the island on whose coast this harbor is located, has a population of 3,700 and an area of 54 square miles, while Upolu has an area of 340 square miles, and Savaii 659 square miles. By the above agreement the German and British governments withdrew

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their claims to this island in favor of the United States.

Pagoda, the temple of an idol in India. They belong both to antiquity and modern times. Some are wonderfully large and magnificent. They consist of one or more quadrangular courts with towers at the corners, surrounded by a wall. Large pyramids rising in stages cover the entrance, behind which extend colonnades. Inside the courts are lustral pools, colonnades, and large halls, called Tschultris, which are used to lodge pilgrims in. Small side temples appear with cupolas surmounting the accessory buildings. Behind the first court is often a second and a third, in which, finally, the chief temple stands. Though the architecture of all these constructive designs has no pretensions to artistic or stylistic importance, still a wonderfully fantastic effect is produced by a tasteless excess in peculiar ornamentation and architectural features. The most important pagodas are those of Madura, Tanjore, and Chillum-baram. The most celebrated is that of Juggernaut, in the island of Ramisseram, completed toward the end of the 12th century. All these buildings are of a pyramidal shape, with vertical stages, which are separated by curved roofs and terminate above in the form of a cupola. Rows of small cupolas stand out from the roofs of the stages.

Also a coin of gold or silver, current in Hindustan, and varying in value in different localities from \$2 to \$2.25. Its value, when made of gold, by weight is equivalent to about \$1.80 of American standard gold coinage.

Paguma, a group of mammals, genus *Paradoxurus*, family *Viverridae* (civets and genets), inhabiting Eastern Asia. The peculiar masked paguma (*P. larvatus*) has a white streak down the forehead and nose, and a white circle round the eyes, which give it the appearance of wearing an artificial mask.

Pagrus, in ichthyology, a genus of *Pagrus*. Thirteen species are known, chiefly from the warmest parts of the temperate zones. *P. vulgaris*, *P. auriga*, and *P. bogarti* are from the Mediterranean. *P. aigypus*, from the coasts of the United States, is the scup, porgy, or missep, an important food fish, about 18 inches long; weight about four pounds. *P. unicolor*, the snapper, is very common on the shores of Australia and New Zealand. It is excellent eating, and attains a length of three feet and a weight of about 20 pounds.

Pagurus, the hermit-crab, or soldier-crab; the typical genus of the family *Paguridae*. The species are numerous on almost every coast. They occupy the cast-off shells of gasteropods, attaching them-

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selves thereto by the hooked appendages of the abdomen. The genus is apparently represented in the Red Crag, which is of Pliocene age.

Pahang, a State on the E. coast of the Malay Peninsula; area, 10,000 square miles; pop. (1901) 84,113. By the treaty concluded between Great Britain and the Sultan of Pahang in 1888 the control of the foreign relations of that State was conveyed to the government of the Straits Settlement; and Pahang is now practically a dependency of that colony.

Pahlanpur, or **Palanpur**, a town of India, capital of a native State of the same name; 83 miles N. of Ahmadabad in Bombay presidency. Pop. 17,547. The Pahlanpur agency comprises Pahlanpur and 12 other states in the N. of Bombay, with an area of 8,000 square miles, and a pop. of 576,478.

Paiconecas, a race of Indians in Northeastern Bolivia, who were formerly quite numerous. They were agriculturalists and a portion of them were converted by the Jesuits and joined the mission of Concepcion, where, in 1831, there were about 500 of them. They are probably of the same stock as the Paunacas, a tribe mentioned by Fernandez.

Paidology, the scientific study of the life, growth, ideas, and all that pertains to a child.

Pailleron, **Edouard**, a French dramatist; born in Paris, France, Sept. 17, 1834; began life as a clerk in a notary's office; and published in 1860 a volume of satirical poetry, and a play. Among his most successful subsequent productions are: "The Last Quarter," produced at the Théâtre Français in 1863; "The Second Monument," at the Odéon in 1865; "Society Where One Enjoys Himself," at the Gymnase, in 1868; "Helene" (1872); "The Spark" (1879); "The Strolling Players" (1894); "Society Where One is Bored" was produced at the Comédie Française in 1883, and had an altogether unprecedented run. To this piece of contemporary satire—for it is rather that than a play—M. Pailleron owed his election (1884) to the Académie Française. He died in Paris, April 20, 1899.

Pain, an uneasy sensation of body, resulting from particular impressions made on the extremities of the nerves transmitted to the brain. Physical pain may be produced by various causes—by injuries to the organs in which the pain is localized; by a peculiar state of the brain and nerves; or by the sympathetic affection of an organ at some distance from that which has been injured. It is often of great service in aiding the physician at arriving at a correct diagnosis of a disease, and still more obviously in frequently being the only intima-

tion which a patient has of the fact of there being a disease which demands a remedy.

Pain, Marie Joseph (pang), a French dramatist; born in Paris in 1773. Beginning with "Saint-Far, or Love's Daintiness," in the initial crisis of the Revolution (1792), he followed it with a long series of vaudevilles and comedies, some of which had great success; among them: "A Flat to Let" (1799); "The Connoisseur" (1800); "The Duke's Portrait" (1805); "Love and Mystery; or, Which Is my Cousin?" (1807); "The Dreamers Awakened" (1813); "The Ghost" (1816). He died in Paris, in 1830.

Paine, Charles Jackson, an American sportsman; born in Boston, Mass., Aug. 26, 1833; was graduated at Harvard College in 1853 and entered the National army as captain of the 22d Massachusetts Volunteers on Oct. 8, 1861. He served with distinction during the Civil War; participated in the battle of Drury's Bluff, Va.; the attack on Newmarket, Va.; and in the expedition against Fort Fisher; and afterward, with General Sherman's army in North Carolina, commanded the district of Newbern. He was promoted Brigadier-General of volunteers in July, 1864; received the brevet of Major-General of volunteers on Jan. 15, 1865, and was mustered out of the service in January, 1866. After the war he began to occupy his spare time with yachting; became a member of the New York Yacht Club, and four times successfully defended the "America's" cup; once in 1885, when he defeated the "Genesta" with the yacht "Puritan," of which he was a part owner; again in 1886, when he defeated the "Galatea" with his "Mayflower"; again in 1887, with his yacht "Volunteer" against the English yacht "Thistle"; and last in 1893, when he defeated Lord Dunraven's "Valkyrie" with the yacht "Vigilant."

Paine, Halbert Eleazar, an American military officer; born in Chardon, O., Feb. 4, 1826. He was a general in the Union army during the Civil War; Republican member of Congress from Wisconsin in 1865-1871; and United States Commissioner of Patents in 1879-1881. He published a "Treatise on the Law of Elections to Public Offices" (1888). He died April 15, 1905.

Paine, Horace Marshfield, an American physician; born in Paris, N. Y., Nov. 19, 1827; was graduated at the Medical Department of New York University in 1849; made extended efforts to bring about legislation giving equal privileges and rights to representatives of medical institutions and to promote higher standards of medical legislation; and was identified at various times with about 30 medical societies, acting as secretary of nine. His publications include; "Laws of the State

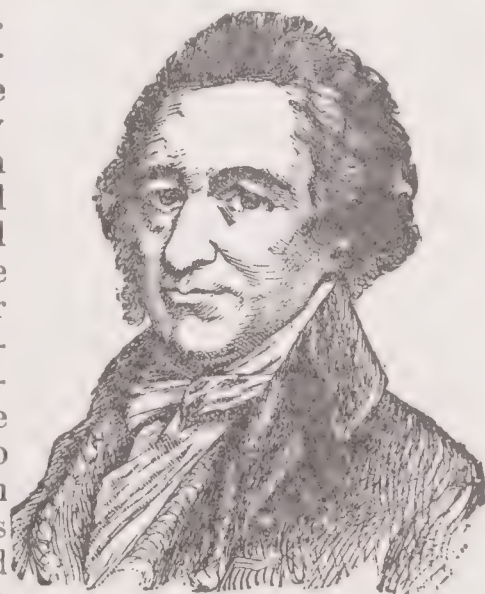
of New York Regulating Practice of Medicine" (1860); "Elevation of Medical Education" (1872); etc. He died Dec. 6, 1903.

Paine, John Knowles, an American organist and composer; born in Portland, Me., Jan. 9, 1839; was Professor of Music from 1874 at Harvard College. His compositions are chiefly piano pieces, with a mass in D, an oratorio, "St. Peter," the "Œdipus Tyrannus" (incidental music for Sophocle's tragedy), the opera "Azara," Columbus march and hymn for the World's Columbian Exposition (1892), etc. He died April 25, 1906.

Paine, Robert Treat, an American jurist, signer of the Declaration of Independence; born in Boston, Mass., March 11, 1731; was a delegate to provincial and continental congresses, and held offices of attorney-general of Massachusetts and judge of Supreme Court; was an able judge. He died in Boston, May 11, 1814.

Paine, Robert Treat, Jr., an American poet; born in Taunton, Mass., Dec. 9, 1773. During the greater part of his erratic career he was engaged in various literary pursuits, though he was at one time in business, and later practised law for a brief period. He will be best remembered as the author of two songs, "Rise, Columbia," and "Adams and Liberty." Among his poems are: "The Invention of Letters" (1795), and "The Ruling Passion" (1797). He died in Boston, Nov. 13, 1811.

Paine, Thomas, an American political writer; born in England, in 1737. He early distinguished himself by his literary abilities and republican ideas. At the outbreak of the Revolutionary War he, in 1774, emigrated to the United States, when he became editor of the "Pennsylvania Magazine," and gave an impulse to the Revolution by his famous pamphlet called "Common Sense," in which he advocated the policy



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of separation and independence. He went to Paris in 1789, and published, in 1791, his "Rights of Man," in reply to Burke's speech on the French Revolution. In September, 1792, he was elected a member of the French National Convention, acted with the Girondists, narrowly escaped death in

the Reign of Terror, and brought out in 1795 his celebrated deistical work entitled "The Age of Reason." He returned to the United States in 1802 and died in New York, June 8, 1809.

Painters' Colic. See LEAD POISONING.

Painting is the laying on or application of color. If applied simply for the protection of a surface from use or weather, it does not come under the head of the Fine Arts. But painting does become an art the instant that it includes, intentionally and in whatever degree, the sense of beauty, of decoration, or of the expression of the ideal. Drawing or linear art is a distinct elementary art independent of the other arts. It reaches a step higher with the addition of linear perspective and composition. Chiaroscuro, or light and shade, carries the art yet another step higher. Pictorial art needs now only the addition of aerial perspective to bring it within one degree of rounded completeness. That element is furnished by color, which, in its highest application, includes all the others, and is therefore the first in rank of the pictorial arts, on the principle that the greater includes the less. Even architecture, or decorative construction, when the element of color enters into the scheme of the designer, comes within the province of painting, and sculpture has been known to do likewise.

Sculpture or carving, however rude and whether mere incising or in the round, seems to have preceded color among primitive people. But painting has invariably followed soon, when indeed it has not accompanied sculpture. The Egyptians made abundant use of color from the first, doubtless often for mere preservation, but yet applied with some intention to express the sense of beauty, the color being frequently surrounded by a low relief or laid on a sunken design. The earliest Egyptian remains yet discovered bear witness to this fact. The Greeks used pigments at least as far back as the prehistoric period called the Mycenæan age, or about 1,500 B. C., showing, even then, no small skill in decorating vases and marbles. But Polygnotus, in the period succeeding the Persian invasions, was probably the first Greek painter who merits the title of founder of the great school of painting which reached its climax with Protogenes, Apelles, Zeuxis and Parrhasius, who invented chiaroscuro, reached after a distinct imitation of nature, and united these elements with considerable sense of the principles of composition. Polygnotus received the freedom of the city of Athens for his mural paintings. But even those artists had only four elementary colors,—white, yellow, red and black. The painters of this school made a marked step in advance of their predecessors when to the

simple flat tints or unbroken layers of color in use up to that time they added variation in hues, modulation of light and shade, and some attempt at aerial perspective. The Etruscans, probably borrowing suggestions from the Greeks, developed an admirable school, about three centuries B. C., within the same restricted limits described above. The frescoes still surviving on the walls of Pompeii and elsewhere from the old Roman world, clearly suggest what must have been the character and excellences of the Hellenic pictorial art which was imitated by the Romans. If not as realistic, varied or complex in scope as modern artists, it may be admitted that the painters of Greece must have possessed great genius. Contributory evidence of this fact is found in the prices paid for Greek paintings by connoisseurs whose taste had been cultivated by a study of the masterpieces of Hellenic plastic art, as well as in the honor shown to the Greek painters. The famous Venus Anadyomene, painted by Apelles, was bought by a Roman plutocrat for a sum equivalent in our money to \$1,200,000. And Alexander the Great allowed his favorite mistress, Campaspe, to pose as an artist's model, such was his appreciation of the painter's art. In the period succeeding Alexander painting took precedence of literature.

At the same time it must be allowed from remarks made concerning Polygnotus and some of his contemporaries, that with most, if not all, Greek painters careful drawing of the line was more sought after and practiced than variety and expressive modulation of color. This peculiarity continued until the early Italian period. Giotto's famous drawing of a perfect circle at one stroke, called Giotto's O, is more famous than his color. The fact was due quite likely to the scarcity of colors in the chromatic scale of those days, and the difficult methods for applying paint. When Ingres sought to revive the classical school, he instinctively emphasized line rather than color. The decorative painters of Phœnicia and Asiatic peoples in general seem, on the contrary, to have given special attention to color. Hence the brilliance of textile fabrics and other arts common to Asiatics in all ages. It will be remembered what splendor is added to the mouldings of the Alhambra by the addition of vivid color. On the other hand, these works have lacked in the study of the figure and perspective.

The revival of the arts, especially in Italy, created styles of architecture which in their scheme came to demand color, and offered large wall spaces for mosaic and fresco painting. Hence great masters and schools arose fitted for this very species of art. The Renaissance, in turn, produced

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the greatest innovation and opportunity yet presented to the world for the progress and development of the genius of painting. This was the introduction, first, of varnish, of which varieties were known but only sparingly used in classic times, and then of oil as a medium in the art of painting. Hitherto the chief methods had been fresco and distemper, whose limitations had greatly hampered variety of style, individual expression, and imitation of more than a few phases of nature. No one step in the history of painting has been more important and decisive than the invention of oil painting, by using quick drying oils, in the early fifteenth century—generally attributed to Jan Van Eyck. The idea was not wholly new, but that painter made it thoroughly practicable.

The methods and means for the application of color are numerous. Some of them are rarely used now, although attempted revivals of this or that process occur from time to time. The ancients depended chiefly on encaustic painting, tempera or distemper, and fresco. In the first of the above processes the colors were mixed with wax and rosin, and were liquefied by heat when applied. It is evident that this method required quickness and flexibility of touch on the part of the artist, while at the same time it was limited in satisfactory results compared with modern means and practice. But, at any rate, encaustic painting exceeded other methods in ability to stand exposure to the elements. In tempera painting the colors are mixed with yolk of eggs or gums, and sometimes with the milky juice of fig-tree sprouts, and are laid on a dry surface. Occasionally an oil varnish covers the painting. Tempera was employed sometimes in paintings on panel, especially portraits, and is still used, although infrequently, in scene painting and interior decorations. This is probably the oldest known method of painting. Unlike tempera, the colors in fresco painting are mixed with water, and are laid on a moist surface, generally fresh plaster, of which only so much is spread at once as can be covered by the outline pricked on the plaster through a design on paper, and filled in with color before the plaster becomes fixed. Naturally this process demands quick handling and assured confidence. The masters of the early Italian school made great use of fresco painting. But the quick spread of the practice of oil painting, with its much greater facilities for modifying and retouching compositions, and for enlarging the scope of easel painting, soon caused the above processes to fall into comparative disuse.

Oil painting is applied to almost any smooth surface, but generally to copper, to panel, and above all to canvas, of which

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several varieties are made, to suit the subject or the style of the artist. Modern mechanical and chemical skill have done much to relieve the labors of the painter. Formerly colors were ground by the painter himself or his assistant, and were mixed with the oil on a smooth marble slab with a roller. When prepared, the pigment was put into small bags of bladder skin, tied firmly at the neck, and kept for future use. This process took much time; but it is all changed now. The colormen, who represent an important business in modern art, sell the paints properly ground, refined and mixed with oil, and placed in airtight collapsible metal tubes. The colormen have been of further use in preparing a variety of vehicles to suit various styles, and a large number of new colors and tints, as well as all manner of appliances for reducing the labor of the painter. Whether greater works of genius are produced today than formerly, some might be inclined to question, but in any case the mechanical difficulties of painting have been vastly reduced. It may be admitted also that although the best painters use but a few of the colors now at their command, not often more than a dozen, relying on the others as a reserve force, yet, according to the subject or style, no two artists use the same scale of pigments, and hence a large number of the colors now manufactured find a use somewhere. The oils used, which are called vehicles, are chiefly from nuts, poppies and linseed, the latter boiled to hasten drying. It may be added that the pigments are for the most part vegetable or mineral, but sometimes of animal substances.

Water colors, or aquarelle, are rendered fluid by water, as the name implies, instead of with oil. In modern times they have commonly been applied on paper or cardboard. Generally heavy paper is used, especially prepared and grained to aid the impression of substance and atmosphere. Water colors dry almost instantaneously. The lights are produced by leaving the natural white of the paper, softened, perhaps, with a pale, warm tint, and proceeding thence by gradations to the darks. In oil paintings, on the contrary, one proceeds from dark to light, otherwise a muddy effect would result and the lights would very likely be deadened. Opaque colors and semi-liquid white, called Chinese white, are also known as body colors. They are liberally used now in aquarelle to give the effect of solidity and to strengthen the lights. But this practice is not universally approved.

Guache is a color paste resembling water colors. It is especially used in Italy for miniature genre and landscape. But it lacks suggestion of atmosphere.

In all these methods, white, although grey by the side of sunlight, is still the highest

power obtainable for representing it. This artificial light is rendered by white lead and white zinc, while black, at the opposite pole of the scale, is yielded by calcined bone, ivory black and graphite. Extreme white and black, without modification, are very rarely used in application, and then in minute quantities. The desired effect of light is generally obtained by contrast with adjoining tints and colors, with reflected lights and darks, and with the tonality of a painting. The lights also are rendered by opaque, and the darks by thin layers of so-called transparent, pigments. Some colors are much more dense than others. This fact is most noticeable in oil painting. The process called glazing means to overlay and modify the tone of a color with the film of transparent paint loaded with oil. Scumbling, on the other hand, means to produce the same effect more forcibly with what are called opaque colors. Artists differ as to the value of glazing and scumbling, those who practise a bold, broad handling considering them injurious to the effect desired. These, like many other art methods and theories, are practically matters of individual taste. But so much cannot be conceded of some of the pigments, as to what should be used and how. This observation applies especially to oil painting. Some pigments which have a brilliant effect when first laid, incline to crack, grow dark or change color within a short time. Such, for example, is bitumen. The question with the artist is, whether for a brief effect he is willing to sacrifice the permanent life of his work. Of all the blues only one, cobalt, can be relied on as absolutely permanent; the others, even ultramarine, a superb pigment and the only pure primary color, fade or change their hue, more or less gradually, like the pearl, the opal, or the turquoise. For glowing effects there is no color superior to the cadmium yellows. Yet, mixed with certain pigments, or touched with a palette knife, they are liable to turn black. Naples yellow is almost as dangerous. In general the most permanent pigments are those made from minerals. Many of the tints compounded by modern chemical science must be used with caution, however tempting. In general water color paintings incline to fade, although slowly, while oil paintings grow dark, due, in part, perhaps, to the oil and varnish used with them. Titian sought to avoid this by drying his works in the sun. Pastel painting, practised with colored crayons, generally on grey paper, and quite in vogue of late years, is an art dating back for several centuries. But it is too perishable ever to come into common use. The granulated powder of which pastel sticks are compounded tends to blow away or rub off, even when held by a fixatif, or gummy spray, and the de-

sign then becomes dull and lifeless. Rosalba Carriera, of Venice, who lived 1675 to 1757, carried pastel to the highest point of excellence. Greuze also, among others, used pastel with the touch of genius. J. Wells Champney, an American artist, likewise acquired prominence for successful handling of this medium in portraiture. Miss Mary Cassatt, one of the most talented of American painters, is also one of the few who have practised pastel painting with distinguished success. But on the whole, this is a branch of painting that is pleasing rather than capable of forcible or distinct individual expression.

Enamel painting, or color applied to copper, gold, or silver, and fused by firing, is one of the most careful and laborious, but also one of the most permanent, varieties of the art of painting. The Persians appear to have been the inventors of this art, and the Japanese, borrowing the art from them, have used it with extraordinary skill and beauty. The Germans, the English, and other Europeans have also cultivated enamel painting with brilliant results. A very fine modern example of this art is the portrait of Queen Victoria, which was executed in England, and was presented by that sovereign to George Peabody, and by him deposited in the Peabody Institute, at Peabody, Mass.

Glass painting, which may be produced in several ways, was one of the most magnificent expressions of chromatic art practised in Europe during the Middle Ages. After a period of decay this field of art has been revived. In America, directed by the poetic impulse of such masters in color as La Farge, Tiffany and their associates, it has rivalled, if, indeed, it has not eclipsed, the splendor of early stained glass. Of the colored ceramics of the East, which include the field of mosaic, that eventually displayed such superb results in Constantinople, Venice, Florence and Palermo, it may be stated that the ceramic art apparently developed first in China and Babylonia. It was probably borrowed from the latter by the Persians. But whether borrowed or original with the latter, they have, by their native genius, carried it at different periods to a degree of excellence never surpassed in the arts of applied color and glazing. Unfortunately their ability in this direction culminated under the Abbasside dynasty, and the most valued secrets of producing it seem to have been lost forever. It may be objected that such arts as stained glass, ceramics, mosaic, tapestry, rug-weaving on the hand loom, and other kindred arts, do not come strictly within the scope of painting. But this objection may be decisively offset by the argument that painting properly means the artistic application of color, and furthermore, that in any case, when the col-

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ored pattern or cartoon of a design is an essential preliminary to its execution, any such design comes under the head of painting. But when this design is reproduced by machinery, thus losing individual character, as in machine woven carpets or in manufacturing potteries, it may be reasonably queried how far such reproductions come strictly within the domain of art. There are other forms of painting, such as the exquisite illuminations of European and Asiatic manuscripts, and the famous lacquer designs of Japan, a magnificent art entirely by itself and peculiar to the genius of that people. But the scope of this article forbids more than mere allusion to them here.

Among the implements commonly used in oil painting is the easel, an upright frame with movable shelf for the canvas. Some easels are quite elaborate. The palette is a thin panel, usually of mahogany, and oval shaped, on which the colors are laid, beginning with white and so around the scale to black. It is held in the left hand on the thumb. The palette knife is of thin flexible steel and is often used as well for loading color in the high lights. The best form is trowel shaped. The maulstick is a slender rod held in the left hand as a rest. Artists possessed of firm touch rarely need it. The brushes used in oil painting are made chiefly of hog's bristles and badger hairs. In water color painting the brushes are made of brown sable and squirrel or camel's hair.

There is a wide difference among artists as to what implements to use, what colors they consider indispensable, and what shall be the manner of applying colors, as well as the control of the subsidiary arts which go to make a good painting. All these matters of detail relate to what is called style, and it is difference in style—and sometimes in class of subjects, also,—that makes what are known as schools. In general, it may be claimed that the artists who found schools are the men of genius, the creators; and the men of talent are their imitators and disciples. There is much feeling displayed by the advocates of each school as to its superior merits; this gives momentum to the establishment of a new style. But, on the other hand, this violence of opinion does not necessarily prove the paramount and final merit of a given school. The fact is that each great school of art follows the laws of evolution, and has its own mission to fulfil. One great advantage of different styles and schools undoubtedly lies in the fact that, if every artist painted like his fellows from age to age, art would be so monotonous that all interest in its existence would cease. As it is, each school results in keeping the imagination and interest alive; it also adds to our knowledge a new truth

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or a new way of looking at the inexhaustible riches of nature. Therefore, it may be laid down as an axiom that in judging of methods and styles and schools of painting, the first principle of criticism should be a broad and catholic spirit prepared to admit that no one system of human effort absorbs all the possibilities for the expression of excellence in any given direction. To which may be added that strong, great, original painting depends largely on a strong personality behind it.

See also such titles as ART; COLORING; DECORATIVE ART; ENAMEL; GLASS PAINTING; ILLUMINATION OF MANUSCRIPTS; LACQUERING; LAKES; MURAL DECORATION; OIL; PIGMENTS; POTTERY; WATER-COLOR PAINTING.

S. G. W. BENJAMIN.

Painting in the 19th Century. Besides the inherent difficulty of properly estimating contemporary work, there is an especial difficulty in dealing with the painting of the 19th century. Art in the past has been traditional, national, and homogeneous; art in our day has been individual, international, and chaotic. At the beginning of the century the so-called "classical revival" destroyed what remained of the traditions of the Renaissance, and almost destroyed the art of painting as such. When men again began to wish to paint, each had to experiment for himself and to find what methods he could. Modern means of communication and modern methods of reproduction have brought the ends of the earth together, and placed the art of all times and countries at the disposal of every artist. The quantity of painting produced has been enormous; the number of individual artists of some distinction has been remarkable; and the succession of "movements" and revolutions, each rapidly extending its influence over the civilized world, has been most puzzling. From this tangled skein it may, however, be possible to pluck a few threads. Most of the characteristic tendencies of modern painting have had their origin or attained their highest development in France, and France has certainly held the primacy of art in the past century, as did England in the 18th, Holland and Flanders in the 17th, and Italy in the 16th. The history of modern painting is largely the history of painting in France, and we may safely devote to that country most of the limited space at our disposal. Yet in the first third of the century there is really only one name in France, or, for that matter, on the continent of Europe, that takes high rank. David was a man of force, but neither he nor his followers were painters, and still less were the cartoonists of Germany; Prudhon alone was a really great artist. He was deeply influenced by Correggio, but he had an in-

dividuality of his own, and, in spite of the ruin wrought by bitumen, his best canvases are singularly lovely, and of all modern work approach nearest, perhaps, to the power of flesh painting of the old masters. Later the classical school produced another artist of high rank, however little of a painter, in Ingres. In him the classical tradition was profoundly modified by study of Raphael. He was not a great draughtsman in the sense of mastery of significant form, but he had rare feeling for beauty of line. His drawings are exquisite and a few of his portraits will prove immortal. His contemporary, Delacroix, was the head of the romantic revolution. This revolution was, however, essentially a literary rather than an artistic movement. Delacroix was a man of great intellectual power, but hardly a greatly successful painter. What he did was to break down the classical tradition and make room for modern art rather than himself to create it. He and his contemporaries were greatly influenced by English painting, and in the first third of the century English painting was still the most vital in Europe. Affected as are the works of Sir Thomas Lawrence, he was still a continuator of the traditions of Reynolds and Gainsborough and, through them, of Van Dyck and Rubens. England was the latest country to be reached by the Renaissance, and the country that longest retained the traditions of painting; and in England the classical school had hardly existed. When painting began to revive, it was first to England and then to Rubens that it turned for its examples. The greatest achievement of painting in this century is the creation of modern landscape; and the most singular phenomenon, as Fromentin pointed out long ago, is the extension of the methods of the landscape painter to other branches of art. Now, the history of modern landscape begins in England. Turner cannot be neglected; he was indubitably a powerful and original genius. But he stands alone. It was Constable, the inheritor of the tradition of Gainsborough and of Rubens who first stimulated the study of landscape in France. It was in France that under this stimulus grew up a school of painters of landscape, and of figures and animals in their relation to landscape,—the so-called “Barbizon School,”—which produced the art of this century that most nearly equals the great art of the past. If any painters of our day are to be ranked as great masters, these painters are certainly Millet, Corot, Rousseau, and Troyon. The others commonly named with them are so inferior to them that they need not be separately considered. Rousseau’s art is founded on Rubens and the Dutch, Corot’s on Claude. What they added was a profound study of nature, and particularly of natural light and what painters

call “values.” Rousseau is naturalistic and rugged, while Corot is lyric. His best work is perhaps the most delicately poetical and beautiful ever produced. In a landscape almost as fine as theirs, Troyon placed cattle and Millet the rustic man. How wonderful as a pure landscapist Millet was, is perhaps hardly understood. His peculiar distinction is that he was the first painter to study man in nature, and to give the relation of the figure to its surroundings. But besides this modern quality he had in large measure the qualities of all great art. He was a master of simple and dignified composition, a noble colorist, and the greatest master of drawing as expressive of the action of the human figure since Michael Angelo. Perhaps no other master, certainly no other modern master, has shown such capacity to express the essential nature of a movement and to resume it in a permanent type—to paint “The Sower,” not a sower.

The successors of the Barbizon School were those who have been called the “Impressionists.” With them the study of light and the painting of everything as if it were landscape reached its extreme. Composition, drawing, even color for its own sake, were more and more neglected, while the analysis of light became the one essential, and the relations of things seemed vastly more important than the things themselves. Manet, who is generally considered the founder of this school, did not really carry its peculiar manner very far. He began with a rather unsuccessful attempt to paint like Velasquez; in his last days he was influenced by younger men and attempted something like the parti-colored manner of Monet, but his most characteristic work is blackish in color, flat, and with heavy outlines. More or less associated with the school was an original painter of considerable power Degas, but its most influential exponent is Claude Monet. It is he who has carried farthest the experiment of dissecting and recombining the solar spectrum and of producing light by “ocular mixture” of colors. The permanent influence of the school will probably not be very great. It will have somewhat broadened the aims and enriched the palettes of other painting; but its neglects were too many, and it was bound to be succeeded by an art that should again take up the study of beauty, of composition, of form, and of decorative color. The great bulk of French painting has always been and still remains academic. The officially recognized painters of France—the medalists and members of the Institute—are generally men of the schools, trained in draughtsmanship, feeble in color, conventional in composition. Some of them have attained great power and distinction, notably Gérôme, Meissonier, Elie

Delauny in his wonderful portraits, and Baudry (who, however, belongs rather with the decorators); but they have added little that was new to art. Their output and that of their followers has been much modified by two influences; that of the great modern exhibitions and that of photography. The "exhibition" is distinctly modern—a child of the 19th century. From putting into museums those things of beauty which had outlived their original purpose we have come to make things especially for museums, and to get together temporary museums each year for their exhibition. Hence the gallery picture and the *machine du salon*. The Barbizon men were often kept out of the salon, and the salon had not in their time reached its present proportions. The impressionists have largely kept themselves out. For those who have regularly participated in the annual exhibitions, the desire to be seen in the crowd has resulted in a steady increase in the size of canvases, with no justification in subject or decorative intention; in constantly growing sensationalism of subject; and, finally, in all sorts of fads and technical extremes. There have always been naturalists in painting, but photography has shown us, as nothing else ever could, what nature is actually like. Almost with the invention of photography came the Pre-Raphaelite movement in England, a short-lived attempt to abandon all artistic conventions and to substitute for them the painstaking and accurate portraiture of natural fact. A similar ideal attained more nearly its realization in France at a much later date. With Bastien-Lepage, the tendency to consider man as a part of landscape and the tendency to minute naturalism were combined. The model was posed out of doors, and both the figure and its surroundings patiently studied and realized. All fleeting effects had to be abandoned in favor of the gray daylight that alone permits long study in the open air, and composition, style in drawing, and even beauty were sacrificed to fidelity. At his best the result was amazingly like the still unrealized photography in colors. Some of his portraits and pictures are masterpieces in their own way, and before his death he did some beautiful landscapes. With the general mass of painters the influence of photography has been almost wholly for evil, and its result a dead level of commonplace. Outside of all the schools there have been, meanwhile, here and there, independent artists who have, each in his own way, kept alive this or that quality of more ancient art. Rossetti, more poet than painter, soon abandoned Pre-Raphaelism for a decorative formula and the study of color and sentiment. His friend and pupil, Burne-Jones, modified while he carried on the Rosset-

tian tradition, and he and his numerous followers have been, in our day, the especial champions of the Florentine ideal of decorative line. Beside them, but apart from them and tracing his inspiration to the Venetians, was George Frederick Watts. In spite of uncertain draughtsmanship and a fumbling technique, his dignity of composition, elevation of feeling, and occasional grave splendor of color raise him to a rather lonely height among 19th century painters, and he more often reminds one of the great old masters than any other modern. Gustave Moreau was a sort of French Rossetti, enveloping a purely personal sentiment in a form unlike any other, while in Germany the profoundly original and imaginative genius of Boecklin has kept up the protest against mere realism. In these men and in others, their contemporaries, the various elements of painting as an art—imagination of subject, beauty of drawing, intricacy of pattern, richness of color, gravity and simplicity of tone, even brilliancy of handling and the manipulation of material—have had their exponents. But perhaps the most characteristic phase of the art of the end of the century, in its reaction against naturalism, has been the revival of pure decoration. In England this has led to the arts and crafts movement, with its somewhat eccentric mediævalism, and it had its somewhat comic phase throughout the civilized world in the poster mania. Its more serious results have been mainly confined to France and the United States. In France the decorative tradition was never quite lost and it was revived in its fullest splendor by Paul Baudry in his paintings for the foyer of the Paris opera house. As a master of significant form, Baudry was one of the greatest of the moderns and he was a charming colorist also, but he was preëminently a master of decorative composition, and, as a vast scheme of ordered line and space for the decoration of a public building, his great work is perhaps the most notable achievement since the Renaissance. His reputation has suffered some eclipse in these later days, but it is safe to predict that it will sooner or later shine forth again; and it will be seen that he was none the less a great artist for that academic training which it has been something too much the fashion to decry. Indisputably, however, the most influential master of decorative painting in the latter part of the 19th century has been Puvis de Chavannes. In him, to a noble simplicity and a great feeling for composition, rather in spaces than lines, has been added a strong sense of landscape and a mastery of light and value, so that his work, while as "mural" as Giotto's, is as modern as Monet's. Originally a very fair academic draughts-

man, he has come more and more to sacrifice form and detail to monumental gravity and breadth of treatment, till his work always austere, reaches at last perilously near to the verge of emptiness and lack of interest. It is always saved by decorative fitness and by great beauty of tone and quiet color. In our day France has produced much bad decoration as well as some good, but in the hemicycle of the Sorbonne it has left to future ages an indubitable masterpiece. America's serious contribution to the art of the world has been made mainly in the last quarter of the century. Our earliest painters were entirely British in training, and some of them became British in nationality as well. Stuart, Copley, West, and Allston are merely second-rate painters of the English school. The influence of France first made itself felt in Hunt, who was a pupil of Couture and greatly influenced by Millet. He was a man of powerful personality, but what he has left behind him is extremely fragmentary. His contemporary, George Fuller, was a self-educated genius who, in spite of an insufficient training, and through a strange technique, gave glimpses of a valid talent. These are the names of greatest importance till the awakening caused by the Centennial Exposition of 1876, and the return to this country shortly thereafter of the American students from Paris and Munich studios. The work of these younger men was, for some time, reflective of that of their foreign masters, and American exhibitions showed in succession the latest fashions of foreign work. The International Exposition of 1900 has for the first time triumphantly demonstrated to the world that a real American school exists and that it is certainly second only to the French. Yet of the artists whose work makes up this showing, the two most distinguished are men to whom America can make but slight and doubtful claim. The name of Whistler belongs to the history of art at large rather than to that of art in America. A contemporary of Manet and an exhibitor with him in the famous *Salon des Refusés* of 1863, he has never returned to America, but has lived in Paris or London, and has lived long enough to see work which was first laughed at now finally accepted as among the most accomplished of the century. Always intensely individual, neither draughtsman nor colorist, and least of all a naturalist, he has devoted his art entirely to refinements of tone and refinements of handling. His work is now as indiscriminately praised as it was formerly attacked, but his best things have an abiding charm, and he is today one of the most widely influential of living painters. John Sargent, a much younger man, is even less American than Whistler, for, though of American parentage, he was born abroad

and his training was, as his art remains, wholly French. His sense of color is, like that of most French painters, rather mediocre, and beauty of tone is not especially his province. His distinctive qualities are a profound mastery of drawing, as expressed by planes rather than by lines, and a wonderful manual dexterity. These two qualities, in combination, have made him one of the most brilliant of modern technicians, and, added to them, a strong sense of character has made him perhaps the first of living portrait painters. No other of the many able and clever Americans residing abroad has reached the degree of distinction attained by these two, nor has any of them, unless it be Mr. Vedder, given any distinctively national or personal note. It has been otherwise with painters who have either remained at home or, once their apprenticeship finished, have returned to this country and have been forced to rely upon themselves. Two Americans, Inness and Wyant, will surely take high rank among the landscape painters of the century; the first a master of passionate and powerful color, the second a gentler and more delicate nature; both were influenced by the men of Barbizon, yet each struck a note of his own, and each had something national as well as personal to add to the art of the world. With the landscape painters also may most conveniently be classed one more intensely American than either of these, Winslow Homer. Possessing no foreign training, showing no foreign influence, always himself, Homer has steadily pursued his way, attaining year by year more nearly to his own ideal. His drawing is not always sure, his coloring is rather neutral, his handling is never brilliant, but a strong personality marks everything he does, and figure or landscape is seen with a true artist's vision. No marines ever painted give a greater sense of the weight and power of water than do his, and he has painted some figure-pieces of marvelous vigor. Besides these there stand a whole school of younger men who have absorbed the training of Europe and have felt all contemporary influences, but whose work, in accent as in subject, remains American, and who are today the most vital landscape painters in the world. Among them may be specially mentioned D. W. Tyron and Horatio Walker, the first more influenced by French methods, the second by Dutch, but each an individual artist of great force. That America has something to say in figure painting as well as in landscape is evident when one thinks of the exquisite sentiment of Tayer, the scholarly and clean-cut drawing of Brush, the delicate charm of Dewing, and the brilliant craftsmanship of Chase. In the work of these men and their fellows there is a sincerity, a scorn of sensational-

Paisley

ism, a true pursuit of art for its own sake, that are rare in the painting of today. Finally, America has done and is doing something interesting and valuable in pure decoration. Years ago John La Farge, whose work in stained glass is as new in kind as it is supreme in merit, so that he may almost be called the inventor of a new art, did some admirable painting in Trinity Church, Boston. After that, little was attempted till the Chicago World's Fair of 1893 gave an opportunity to several of our painters to show what they could do in that line. Since then one public building after another has been decorated with paintings, and the results are familiar to us all. Such men as Simmons, Blashfield, Mowbray, and H. O. Walker have each developed a decorative style of his own, while they have managed to work together and to preserve the general harmony of a great decorative scheme in a way which contrasts most favorably with the decoration of such foreign buildings as the Paris Hôtel de Ville or the Pantheon. We have produced no single work of the value of some of those by Baudry or Puvis de Chavannes, but our mural painting has been marked by reticence, dignity, and true decorative spirit. Since the wave of the Renaissance first started from Italy, the country last reached by it has been the country that at any time has produced the best art. The wave has barely reached us, and it is not impossible that it is to America we must look for the best art of the 20th century.

KENYON COX.

Paisley, a municipal and parliamentary burgh of Scotland, in Renfrew county, on the White Cart, about 3 miles above the confluence of the united White and Black Cart with the Clyde, and 7 miles W. S. W. of Glasgow. It consists of an old town on the W. or left, and a new town on the E. or right bank of the river, communicating by three handsome bridges. The most noteworthy building is the Abbey Church, now a parish church, belonging to a monastery (of which little else now remains) founded in 1163 by Walter, son of Alan, the first of the house of the Stewarts, and at one time a very opulent foundation. Since 1860 the main body of the church, consisting of a nave and two aisles, the latter separated from the nave by five massive clustered columns on each side, has been restored. In 1889 a monument was erected by Queen Victoria in memory of her ancestors buried here. In St. Mirren's Chapel or the Sounding Aisle, on the S. side, stands a tomb supposed to have been built in honor of Bruce's daughter Marjory. The only other noteworthy edifices are the new county buildings, the old county buildings and prison, a quadrangular pile in the castellated style; the town hall, an imposing

Palæarctic Region

building in the classical style, erected by the munificence of the brothers Clark; the Neilson educational institution; the buildings containing the free library and museum; the Coats Observatory, the gift of Sir Peter and Mr. Thomas Coats; and the Coats Memorial Church (Bap.).

Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the 19th century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, and to it has been added that of sewing cotton, for which Paisley is celebrated all over the world. Among the other manufactures are tapestry, embroidery, tartans, and carpets. There are also dye and print works, engineering works, soap works, manufactories of starch, corn flour, mustard, and chemicals; distilleries, breweries, and ship-building yards, chiefly for river steamers and dredgers. The river Cart has now been widened and deepened and commodious harbors constructed. Wilson, the ornithologist; the poet Tannahill, and Professor Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley is a town of ancient origin, having been at one time a Roman station under the name of Vanduara. Pop. (1891) 69,295; (1901) 79,355.

Paiute, or **Piute**, a name strictly belonging to a small tribe of North American Indians living in Southwestern Utah, but generally given to a number of Shoshonean tribes which are scattered throughout Utah, Nevada, Arizona, and Southeastern California. They number in all about 5,000.

Paixhans, Henri Joseph, a French military officer; born in Metz, in 1783. He was the inventor of the guns and projectiles which bear his name. The Paixhans guns are adapted to throw shells and hollow shot. These guns and projectiles were used on board the Russian fleet at the battle of Sinope, when the Turkish ships were annihilated by their deadly effects. He died in 1854.

Pakenham, Sir Edward Michael, an English military officer; born in Ireland March 19, 1778. He was a brother of the Earl of Longford. He served in the Peninsular War and as general commanded the British expedition against New Orleans in 1814, in which he was defeated by General Jackson at the battle of New Orleans, when he was killed Jan. 8, 1815.

Palæarctic Region, a very extensive region, comprising all temperate Europe and Asia, from Iceland to Bering Straits, and from the Azores to Japan. To the S. it includes the extra-tropical part of the Sahara and Arabia, and all Persia, Kabul, and

Palæichthyes

Baluchistan to the Indus. It comes down to a little below the upper limit of forests in the Himalayas, and includes the larger N. portion of China, not quite so far down the coast as Amoy.

Palæichthyes, or **Paleichthyes**, a subclass of fishes. The heart has a contractile *conus arteriosus*; intestine with a spiral valve; optic nerves non-decussating or only partly decussating. It embraces two orders, *Chondropterygii* and *Ganoidei*.

Palæography, or **Paleography**, an ancient manner of writing; ancient manuscripts collectively. Also the art or science of deciphering ancient inscriptions, writings, manuscripts, documents, etc., by a knowledge of the characters, signs, and abbreviations used by the writers or sculptors of various nations at different times; the study of ancient writings and inscriptions, and modes of writing.

Palæologus, an illustrious Byzantine family, first mentioned about 1078, when George Palæologus was a faithful servant of the Emperor Nicephorus III. He was killed while defending Dyrrhachium, or Durazzo, against the Normans in 1081. The Palæologi, the last Greek family that occupied the throne of Constantinople, reigned from 1260 to 1453. A branch of the Palæologi ruled over Montferrat in Italy from 1305 to 1530.

Palæontology, that branch of natural science which treats of fossil organic remains. Much of the light that has been thrown, of late years, on the formation and constitution of the globe is due to the discoveries and investigations of palæontology. The geologist, by its means, is able to trace the successive orders of animals and plants which have inhabited the earth at different periods of its existence. All fossiliferous systems may be viewed in two great aspects — either as regards their mere mineral and physical relations, or as regards the plants and animals found as fossils in their strata. The former constitutes the lithology and the latter the palæontology of a formation. In order, however, to arrive at a knowledge of the cosmical conditions which regulated the deposition of the strata of a system, an acquaintance with botany and geology is indispensable to the geologist, in order that he may be able to apply their general principles to the solutions of those problems that arise out of the science he is investigating.

Palæotherium, or **Paleotherium**, the type-genus of the family *Palæotheridæ*. It was founded on remains discovered by Cuvier in the quarries of Montmartre, and named by him *P. magnum*. His restoration of the animal has proved incorrect, the discovery of a complete specimen showing this

Palagonite

species to have resembled an antelope in general figure. Several species are known, varying in size from that of a roedeer to that of a tapir.

Palæozoic, or **Paleozoic**, in geology, the term generally applied to the series of strata commencing with the first rocks which have traces of life, and ending with the upper part of the Permian. As the uppermost strata of all are called by some Quaternary, those immediately beneath these Tertiary, and those a stage further down Secondary, one would expect the basal rocks of the series to be called Primary. But unhappily that term was misused in the infancy of geology, being applied to granite, gneiss, etc., in consequence of which, to avoid confusion, it was allowed to become, for a time at least, extinct — the word palæozoic being substituted in its room. Sir Charles Lyell, however, in his "Student's Elements of Geology," retained its use, dividing the "Primary or Palæozoic," from beneath upward into Laurentian or Archæan, Cambrian, Silurian, Devonian, Carboniferous, and Permian. Judged by the thickness of the beds, the Palæozoic strata took a vastly longer time to deposit than all the strata which succeeded, from the close of the Permian to the present time. The palæontological break between the Palæozoic and the Secondary rocks is very considerable. (For details see the various divisions of the period.) See FOSSIL: GEOLOGY.

Palæstra, originally in Greece a place for wrestling, afterward a place for training the athletes who contended in the public games.

Palafox y Melzi, José de, Duke of Saragossa, a Spanish soldier; born in 1780. He was of a distinguished Aragonese family, and rose to the rank of Brigadier-General in the Spanish guards. His defense of SARAGOSSA (*q. v.*), July 22, 1808, to Feb. 21, 1809, which only yielded to the French after a second investment, is one of the most heroic incidents in modern history. Palafox y Melzi was carried a prisoner to France, and not released till 1813. The year after his return home he was appointed Captain-General of Aragon, in 1836 was created Duke of Saragossa, and in 1837 grandee of Spain and Captain-General of the guards. He died in Madrid, Feb. 15, 1847.

Palagonite, an amorphous mineral occurring in grains, and forming a large part of many volcanic tuffs. Hardness, 4–5; sp. gr., 2.4–2.7; luster, vitreous; color, yellow, brownish-yellow, red, black; streak, yellow to brown. Composition: Essentially a hydrated silicate of alumina, sesquioxide of iron, magnesia, and lime, with small but varying amounts of soda and potash. Penck,

Palaihnihan

as the result of an exhaustive study of palagonite, declares, however, that no such mineral exists, but that it is a mixture of various mineral substances.

Palaihnihan, or **Pit River, Indians**, a collection of tribes which formerly occupied the territory drained by Pit river and its tributaries in Northeastern California. They are now almost extinct.

Palais Royal, a popular resort of the Parisians, originally a royal palace as the name implies. The original palace was built (1629-1636) by Richelieu, and by him presented to Louis XIII. It was confiscated by the Republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the Duke of Orleans, but in the Revolution of 1848 it was again appropriated to the state. In 1871 it was set on fire by the Communists, but has since been restored. The Théâtre Français and numerous shops now form parts of the buildings of the Palais Royal.

Palamedes, a Grecian hero, the son of Nauplius, King of Eubœa. Being sent by the confederated leaders before Troy to visit Ulysses and find the cause of his refusal to join the expedition, Palamedes discovered that the insanity put on by the King of Ithaca, to avoid leaving his wife and kingdom, was only feigned, and accordingly brought the sage Ulysses back with him. Enraged at being detected in practising a fraud, Ulysses conceived a mortal hatred against the man who had unmasked his hypocrisy, and, resolving to work his ruin and death, bribed one of Palamedes's servants to dig a hole in his master's tent and conceal in it a large sum of money, with which he supplied him, and then carefully to cover the opening. Having effected the first part of his scheme, Ulysses next forged a letter purporting to come from Priam to Palamedes, in which the Trojan monarch reproached the Greek chief for not having sooner fulfilled his contract and delivered the Grecian army into his hands, according to the tenor of his promise and in return for the bribe already delivered to him as payment for his treachery. This letter was carried before the Greek princes. Palamedes was summoned, and protested his innocence, but vainly, as the money was discovered in his tent. He was found guilty by all the army, and stoned to death. Palamedes was a learned man, as well as a soldier, and, according to some, he completed the alphabet of Cadmus by the addition of some letters. To him, also, is attributed the invention of chess and backgammon.

Palanquin (-kēn'), or **Palki**, the vehicle commonly used in Hindustan and the East by travelers. It is a bamboo or wooden box about 8 feet long, 4 feet wide, and 4 feet

Palatinate

high, with shutters which can be opened or shut at pleasure, and sometimes constructed like Venetian blinds for the purpose of admitting fresh air, while at the same time they exclude the scorching rays of the sun and the heavy showers of rain so common in that country. The furniture of the interior consists of a cocoa mattress, well stuffed and covered with morocco leather, on which the traveler reclines; two small bolsters are placed under his head, and one under his thighs, to render his position as comfortable as possible. At the upper end is a shelf and drawer, and at the sides are nettings, of larger dimensions than the ordinary pockets in carriages, for containing those articles which may be necessary to the traveler during the journey. The palanquin is borne by means of poles on the shoulders of coolies.

Palaprat, Jean Sieur de Bigot (pā-lä-prä'), a French dramatist; born in Toulouse, France, in 1650. He is best known for certain lively comedies written by him in collaboration with the Abbé Brueys; chief among these are: "The Mute"; "The Grumbler" (1681); "The Ridiculous Concert" (1689); "The Secret Revealed" (1690). Independently he wrote: "Quid pro Quo"; "Hercules and Omphale"; "The Prude." He died in Paris, in 1721.

Palapteryx, a genus of fossil birds whose remains are found in the river-silt deposits of New Zealand, associated with the gigantic dinornis, and which, like it, resembled in the form of the sternum, and the structure of the pelvis and legs, the living wingless apteryx. Palapteryx, however, seems to have possessed rudimentary wings, in which respect it differed from dinornis.

Palate, the roof of the mouth. The fore part is called the hard palate and the back part the soft palate, the former having an osseous framework and a membrane provided with many muciparous glands, the latter formed by a doubling of a membrane inclosing muscular fibers and numerous glands. In botany, the prominent lower lip of a ringent corolla.

Palatinate, Lower, or Palatinate of the Rhine, the name formerly given to two states of Germany, which were designated, by way of distinction, the Upper and Lower Palatinate, and though not contiguous, were under the control of the same sovereign till 1620. At that period they underwent great changes. Since the wars of the first French Revolution, which contributed more than any event on record to unsettle the ancient landmarks, they have been divided among different German sovereigns, and their very name has disappeared from the maps of Germany. The word palatinate is of feudal origin, and signifies in a more restricted sense the

ing descended from Canaan, the fourth son of Ham and grandson of Noah. In the time of Moses the country E. of the Jordan was conquered and divided among the tribes of Reuben and Gad, and half of the tribe of Manasseh; under Joshua the remainder was conquered and divided between the other 10 tribes. Under the reigns of David and Solomon it became one of the most flourishing kingdoms of Asia. It was conquered, however, by the kings of Nineveh and Babylon, who carried captive first Israel and then

Judæa now became an independent country. It subsequently fell under the dominion of Rome, who established the Herods as tributary kings. It was at this period that Palestine became the theater of those great events which form the foundation of Christianity. The Jews, however, having rebelled repeatedly against the Romans, Titus entered Judæa with a large army, took Jerusalem, which he razed to the ground, and carried the whole nation captive, dispersing them throughout the Roman empire. The country remained in the power of the Romans till the conversion of the empire to Christianity, when it became an object of religious veneration. In the 6th century it fell under the sway of the Mohammedans, which gave occasion to the Crusades. Jerusalem was taken by the European forces, and was under Godfrey of Bouillon erected into a Latin kingdom, which endured for above 80 years, during which the Holy Land streamed with Christian and Saracen blood. In 1187 Judæa was conquered by Saladin, on the decline of whose kingdom it passed through various hands, till, in 1517, it was finally added to the Turkish empire. A railroad connecting Jaffa with Jerusalem has been constructed, and a harbor made at Jaffa.

Palestrina (the ancient Præneste), an Italian city, 22 miles E. by S. of Rome, on the slope of an offset of the Apennines. It contains the chief castle of the Colonnas and the palace of the Barberini family, the owners after 1630. It is built almost entirely upon the gigantic substructions of the ancient Temple of Fortune, one of the greatest religious edifices in all Italy, celebrated not only for its splendor, but also for its oracle, which was consulted down to the time of Constantine. Portions of the ancient wall — Cyclopean blocks of limestone — still remain. Præneste was a member of the Latin League, till in 499 B. c. it joined the Romans. Yet it took a prominent part in the Latin war (340-338 B. c.) against Rome. Having given shelter to the younger Marius in 82 B. c., it was taken and sacked by Sulla. Its elevated and healthy situation, at no great distance from the capital, made it a favorite summer resort of the Romans. Augustus and Tiberius frequented it; Horace found it a pleasant retreat; Hadrian build there an extensive villa; and Antonius erected a palace. Numerous valuable works of art and other remains have been recovered, dating principally from the 8th, and from the 3d and 2d, centuries B. c., the former showing Phœnician influence, the latter being Roman.

Palestrina, Giovanni Pietro Aloysio da, an Italian musician and composer; born in Palestrina, an ancient city 20 miles from Rome, in 1529; and was admitted into



MAP OF PALESTINE.

Judah, into the E. provinces of their empire. After the conquest of Babylon by Cyrus, the Jews were allowed to return to their country, to rebuild their temple, and reestablish their ecclesiastical constitution. Palestine continued thus a province of Persia till after the conquest of Alexander, to whom it submitted without resistance. The Jews were again exposed to oppression from some of the Ptolemies, who having attempted to enforce the adoption of the Grecian idolatry, were met with the most determined resistance by the Maccabees, and Ju-

the Pope's Chapel in 1559. This musician holds the most prominent rank as a composer of ecclesiastical music of that age, his motetts, masses, and chants being still in use. Palestrina has been regarded as the Homer of ancient music and the father of choral melody. He died in 1594.

Palette, an oval tablet of wood, or other material, very thin and smooth, on which painters lay the various colors they intend to use, so as to have them ready for the pencil. In connection with the palette painters use a palette knife, a thin, round-pointed knife for mixing up colors. The palette is held by a hole at one end in which the thumb is inserted.

Paley, Frederick Apthorp, an English writer on architecture; was graduated in 1838 at Cambridge; became a Roman Catholic in 1846; and Professor of Classical Literature in University College from 1874. He edited many Greek and Latin texts, and published a "Manual of Gothic Architecture" (1846), and other writings on similar subjects. He died Dec. 11, 1888.

Paley, William, an English theologian; born in Peterborough, in 1743. He was appointed archdeacon of Carlisle, 1782; prebendary of St. Paul's, London, 1794; dean of Lincoln, 1795. His principal writings are: "Principles of Moral and Political Philosophy" (1785); "Horæ Paulinæ; or, The Truth of the Scripture History of St. Paul Evinced," etc. (1791); "View of the Evidences of Christianity" (1794), his most celebrated work; "Natural Theology; or, Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature" (1802), in some respects the most remarkable of all his writings. He died May 25, 1805.

Palfy, Albert (päl'fē), a Hungarian novelist; born in Gyula, in 1823. In 1848 he started a daily journal, "The Fifteenth of March," which had a powerful influence in inciting the Hungarian people to insurrection. He was incarcerated for several months after the suppression of the rebellion, and then resumed his labors as a novelist. His principal stories are: "The Hungarian Millionaire" (1845); "The Black Book" (1846); "Stories Left Behind by a Refugee" (1850); "Mother and Countess" (1886); "Last Years of Old Hungary" (1890).

Palfrey, Francis Winthrop, an American military officer; born in Boston, Mass., April 11, 1831; was graduated in the class of 1851 from Harvard College; served through the whole of the Civil War as lieutenant-colonel and colonel of the 20th Massachusetts Infantry, and in 1865 he was made Brigadier-General of volunteers for gallant conduct. From 1872 he was a reg-

istrar in bankruptcy. He was the author of "A Memoir of William F. Bartlett" (1879); "Antietam and Fredericksburg" (1882); parts of the first volume of "Military Papers of the Historical Society of Massachusetts"; and various articles in "The North American Review."

Palfrey, John Gorham, an American clergyman; born in Boston, May 2, 1796. He was graduated at Harvard; was pastor of Brattle Street Unitarian Church, Boston; professor in Harvard, 1830-1839; member of the State Legislature, 1842-1843; secretary of State of Massachusetts, 1844-1848; and member of the Anti-Slavery Congress at Paris, 1867. He published numerous lectures, addresses, and sermons; and wrote "The Relation between Judaism and Christianity" (1854). His enduring work, however, is, "The History of New England" (4 vols. 1858-1864). He died in Cambridge, Mass., April 26, 1881.

Palfrey, Sarah Hammond, pseudonym E. FOXTON, an American novelist and poet, daughter of John G.; born in Boston, Mass., Dec. 11, 1823. She resided in Cambridge, Mass. Among her poetical works are: "Prémices"; "The Chapel"; "Agnes Wentworth." She also published the stories "Katherine Morne"; "Herman, or Young Knighthood" (1866).

Palgrave, Sir Francis, an English historian; born in London, England, in 1788. He was a Jew, and his original name was Cohen, which he changed to Palgrave on embracing Christianity in 1823. He was called to the bar in 1827, and made himself known by his edition of the "Parliamentary Writs from 1273 to 1327" (1827-1834); "History of England" (1831); "Rise and Progress of the Commonwealth" (1832). In 1832 he was knighted. He served on the Municipal Corporation Commission, 1833-1835, and was appointed deputy keeper of records in 1838. His other works include "Truths and Fictions of the Middle Ages" (1844); "Reports of the Deputy-Keeper of the Public Records (1840-1861); and "History of Normandy and England" (1851-1860). He died in Hampstead, July 6, 1861.

Palgrave, Francis Turner, an English poet and critic, eldest son of the preceding; born in London, England, Sept. 28, 1824. He was educated at Charterhouse School, became scholar of Balliol College, Oxford, and Fellow of Exeter, filled for five years the office of vice-principal of the Training College for Schoolmasters at Kneller Hall, and afterward was private secretary to Earl Granville, and an official in the Educational Department of the Privy-council. He succeeded Shairp as Professor of Poetry at Oxford in 1886. His works are "Idylls and Songs" (1854); "Essays on Art" (1866);

Palgrave

"Hymns" (1867); "The Five Days' Entertainment at Wentworth Grange" (1868); "Lyrical Poems" (1871); and the "Visions of England" (1881). He is best known, however, as the editor of the admirably selected "Golden Treasury of English Lyrics" (1861, and a 2d series in 1895); "The Children's Treasury of Lyrical Poetry" (2 vols. 1875); "The Sonnets and Songs of Shakespeare" (1877); "Selected Lyrical Poems of Herrick" (1877), of Keats" (1885); and "Treasury of Sacred Song" (1889). He died Oct. 24, 1897.

Palgrave, Sir Reginald F. D., an English writer on history, son of Sir Francis; born in London, England, June 28, 1829. He wrote: "The Chairman's Handbook" (11th ed. 1895); "The House of Commons" "Oliver Cromwell, the Protector: an Appreciation" (1890), in which he presents the antidote to Thomas Carlyle's "Life and Letters of Oliver Cromwell." He died July 13, 1904.

Palgrave, William Gifford, an English traveler, son of Sir Francis; born in Westminster, England, Jan. 24, 1826. He was educated at the Charterhouse School and Oxford, graduating with great distinction in 1846. Next year he obtained a commission in the Bombay Native Infantry, which, however, he soon resigned to become a priest in the Society of Jesus. After a course of study at Laval, in France, and at Rome, he was sent at his own request as a missionary to Syria, where he acquired a wonderfully intimate knowledge of Arabic. Summoned to France in 1860 by Napoleon III. to give an account of the Syrian massacres, he went disguised as a physician on a daring expedition at the emperor's expense through Central Arabia, traversing the entire Wahabi kingdom, and returning to Europe through Bagdad and Aleppo. (1862-1863). With the consent of the emperor, he published his "Narrative of a Year's Journey through Central and Eastern Arabia" (1865), one of the best books of travel in the English language. Palgrave quitted the Society of Jesus in 1864, and was sent by the British government in 1865 to treat for the release of Consul Cameron and the other captives in Abyssinia. He was nominated consul at Sukhum-Kalé in 1866, at Trebizond in 1867, at the island of St. Thomas in 1873, at Manila in 1876, and consul-general in the principality of Bulgaria in 1878, and in Siam in 1880. He was appointed British minister to Uruguay in 1884. His other works are: "Essays on Eastern Questions" (1872); "Hermann Agha: an Eastern Narrative" (1872); "Dutch Guiana" (1876); and "Ulysses, or Scenes and Studies in Many Lands" (1887). He died in Monte Video, Sept. 30, 1888.

Palisade

Pali, an Indian language, originally the popular dialect of Magadha, now Behar. Buddha preached in it, and the writings embodying his faith were composed in it, on which accounts it became the sacred language of Buddhism. It is closely akin to Sanskrit.

Palicourea, a genus of *Psychotridæ*. It consists of shrubs destitute of pubescence, with opposite or whorled leaves, and panicles, thryses, or cymes of yellow or white flowers. Fifty-four or more species are known, all from America. *P. officinalis*, a Brazilian plant, is a diuretic; *P. speciosa*, the gold-shrub of Brazil, is antisypilitic; *P. crocea*, a West Indian one, is emetic. *P. diuretica*, *P. strepens*, *P. sonans*, and *P. longifolia* are also medicinal. *P. maragraavii* is used in Brazil to poison rats and mice. *P. tinctoria*, a Peruvian species, yields a fine red dye.

Palikao, a place on the canal between Peking and its port on the Peiho. Here in 1860 was fought an engagement between the Anglo-French troops and the Chinese, and hence the French general, Cousin-Montauban (1796-1878), who was minister of war in August and September, 1870, received his title of Count Palikao.

Palilia. See PALES.

Palimpsest, a piece of parchment whose original writing has been removed to fit it for a subsequent record. Many old documents were thus obliterated, and the writing is restored by an infusion of gall, dilute hydrochloric acid, oil, etc., a certain trace of the materials of ink remaining in the substance of the parchment which acts upon the substance applied.

Palindrome, a word or sentence that reads the same backward or forward. Examples are: Hannah, madam. "Madam, I'm Adam," a speech that might have fallen from the lips of our first father on meeting his lady in Eden. Another noted palindrome is from the Italian: "Ebro Amleto e Otel ma orbe" Hamlet is drunk, but Othello was blind").

Palinurus, the helmsman of Æneas, who was lulled to sleep at his post, and fell into the sea. When Æneas visited the lower world he related to him that on the fourth day after his fall he made the coast of Italy, and was there barbarously murdered, and his body left unburied on the strand. The Sibyl prophesied that his death should be atoned for, a tomb erected to him, and a cave (Palinurus, the modern *Punta della Spartivento*) named after him.

Palisade, a fence or fencing of pales or stakes driven into the ground, to form an inclosure, as a protection to property. In fortification, a row of stakes set firmly in the ground and presenting a sharp point

Palisander Wood

to an advancing party. The stakes are placed vertically at the foot of the slope of the counterscarp, or presented at an angle at the foot of a parapet, or on the banquette of the covered way.

Palisander Wood, a name in France for rose wood and some other woods.

Palissot de Montenoy, Charles (pä-lē-so' duh môngt-nwä'), a French poet; born in Nancy, France, Jan. 3, 1730. At 14 he took the degree of Bachelor of Theology, but gave up the ecclesiastical career for literature, and was appointed director of the Mazarin Library. With his first tragedies he had little success; otherwise with his comedies "The Guardians" and "The Barber of Bagdad." His satiric piece "The Coterie" (Le Cercle), attacking Rousseau, brought down upon him the enmity of the encyclopedists, who paid him back with "Little Letters on Great Philosophers" (1757), and the comedy "The Philosophers" (1760). He lived on pacific terms with Voltaire, and even dedicated to him his "Dunciad, or War of the Blockheads" (1764). He died in Paris, June 15, 1814.

Palissy, Bernard, a French potter and chemist; born in Algen about 1508. For his ingenuity in painting on glass and other works, he was patronized by Henri III. He wrote several works on natural philosophy, and on subjects connected with the art of pottery. The best edition of his works, which are full of valuable and curious experiments, is that of Paris (1848), with the notes of M. Faujas de St. Fond. His pottery has become celebrated, and few things are more prized by the connoisseur than the famous "Palissy ware." Being a Protestant, he was arrested by the Leaguers toward the end of the reign of Henri III., and died in the Bastille in 1589.

Palissy Ware, a peculiar pottery first manufactured in France by Bernard Palissy of Saintes, about 1555. His works are remarkable for the high relief of his figures and ornament, which consist frequently of models from nature of fish, reptiles, shells, leaves, etc., all most carefully and naturally colored. The art may be said to have died with him, both the execution and design of all the copies made in his peculiar style being very inferior in color and vigor.

Palki. See PALANQUIN.

Palk Strait, a channel between the mainland of India and the N. part of Ceylon, abounding in shoals, currents, sunken rocks, and sand-banks.

Pall, a large black or purple cloth thrown over the coffin at a funeral; a black cloth used for covering a tomb. Also a woolen mantle sent by the Roman emperors, from the 4th century, to the pa-

Palladium

triarchs and primates of the empire, and worn by them as an ensign of jurisdiction. Also a mantle of state; or a kind of fine rich stuff used for making mantles. In heraldry, a figure like the letter Y. It consists of half a pale issuing from the base, and conjoined in the fesse point with half a saltire from the dexter and sinister chief.

Pall Bearer, one who attends the coffin at a funeral; so called from the pall being formerly carried by them.

Palladian Architecture, a style of architecture introduced by Palladio, and conforming closely to the precepts of Vitruvius. As regards style, it falls under the category of Roman Renaissance, but of rather a confused kind, for he adorned buildings of every kind, and of most varied purposes and arrangement, with classical temple-portals, without taking into consideration their object or the requirements of the building as a whole, so that the order was frequently carried up through several stories without any reference to its arrangement. The lower story of palaces built by Palladio, the greater part of which are at Vicenza, is generally of rustic work, while the upper stories have pilasters or a colonnade; occasionally, however, pilasters or arcades are introduced on the ground-floor. The works of Palladio remained for a long period the model for an entire style.

Palladio, Andrea, an Italian architect; born in Vicenza, in 1518. He was architect of the republic at Venice. He perfected his architectural acquirements at Rome, and on his return to Vicenza he established his fame by his designs for many noble buildings both there and in other parts of Italy. From 1560 he erected many buildings at Venice. He was the author of a "Treatise on Architecture." He died in Venice in 1580.

Palladium, in classical antiquities, a celebrated statue of Pallas or Minerva, on the preservation of which depended the safety of the city of Troy. This circumstance being known to the Greeks during the Trojan war, Ulysses and Diomedes, by the advice and aid of Helenus, son of Priam, climbed secretly by night over the ramparts of Troy and carried it off. Some writers assert another statue was taken, and that the real Palladium was conveyed from Troy to Italy by Æneas, 1183 B. C., and preserved by the Romans with the greatest secrecy in the temple of Vesta.

In chemistry, a tetrad metallic element discovered by Wollaston in 1803. Symbol, Pd; at. wt. 106.6; sp. gr. 12.1. It is found, associated with platinum and gold, in South America, and is extracted from the gold in which it is found, by fusing with silver, dissolving out the palladium, etc., with nitric acid, removing silver with common salt, and then adding ammonia and hydrochlor-

Pallantia

ic acid, which throws down ammonia-chloride of palladium as a yellow powder. This, on ignition, yields the pure metal. It resembles platinum in its malleability and ductility, but is more fusible, less dense, and has a more silvery appearance. It is slightly soluble in concentrated hydrochloric and sulphuric acids, more so in nitric acid, but dissolves freely in nitrohydrochloric acid. Its surface is blackened by tincture of iodine, which has no effect on platinum. Like platinum, it forms two classes of compounds, viz., palladious compounds, in which it is bivalent, and palladic compounds, in which it is quadrivalent.

In mineralogy, an isometric native metal, not found pure, but mostly alloyed with a little platinum and iridium. Sometimes found in minute octahedrons, but mostly as grains, with native platinum, in Brazil. Hardness, 4.5-5; sp. gr., 11.3-11.8; luster, metallic; color, steel gray.

Pallantia. See PALENCIA.

Pallas, in Greek mythology, the goddess of wisdom. Her attributes and character were similar to those of the Roman Minerva.

Pallas, a freedman of the Emperor Claudius, over whom he had so great an ascendancy as to persuade him to espouse Agrippina, his niece, and to adopt Nero for his successor. Pallas, in concert with Agrippina, is charged with having hastened the death of Claudius by poison. Nero subsequently caused him to be secretly put to death, confiscated his treasure, amounting to upward of \$10,000,000; but erected a superb monument to his memory. Pallas was brother to the Felix before whom St. Paul pleaded.

Pallas, Peter Simon, a German traveler and naturalist; born in Berlin, in 1741. He studied at Halle, Göttingen, and Leyden, and after making a long visit to England, everywhere applying himself to his favorite science, zoölogy, he settled at The Hague. He was called in 1767 to St. Petersburg by Catherine II., and named Professor of Natural History in the academy. In the following year he set out with the expedition sent to Siberia to observe the transit of Venus, penetrated to the borders of China, and after great hardships and fatigues, and the loss of most of his companions, he returned to St. Petersburg in 1774. There he lived for nearly 20 years, loaded with honors, made tutor to the Grand-Dukes Alexander and Constantine, and very busily engaged in literary labors. By his own desire he afterward settled in the Crimea, the empress giving him a fine house and a good income. But in 1810 he returned to Berlin. He wrote: "Elenchus Zoöphytonum"; "Spicilegia Zoölogica";

Palliser

"Observations on the Formation of Mountains"; "History of the Mongolian Nations"; "Travels Through the Various Parts of the Russian Empire"; and *Zoögraphia Russo-Asiatica*"; etc. Pallas was a member of the French Institute, the Royal Society of London, and many other scientific bodies. He died in Berlin in 1811.

Pallavicino, Sforza, an Italian historian; born in Rome, Nov. 20, 1607. Having taken priest's orders in 1630, he became in 1638 a member of the Jesuit Society, and was created a cardinal in 1659 by Pope Alexander VII. The best known of his writings is "History of the Council of Trent" (1656-1657), intended as a reply to the equally celebrated and liberal work of Paul Sarpi, whose narrative is not altogether acceptable to Catholics. He died in Rome, June 5, 1667. **FERRANTE PALLAVICINO** (1618-1644) wrote pasquinades which bitterly offended the papal curia and the Barberini family; and being betrayed into his enemies' hands near Avignon, he was tried, condemned by a foregone conclusion, and beheaded.

Palleske, Emil (pä-lesk'uh), a German elocutionist and author; born in Tempelburg, Pomerania, Jan. 5, 1823. He gave dramatic readings, especially of Shakespeare's plays throughout Germany. He wrote "Life and Work of Schiller" (1858-1859); "Charlotte von Kalb: in Memoriam" (1880). He died in Thal, near Eisenach, Oct. 28, 1880.

Pallice, La, an artificial harbor opened (1889) near La Rochelle, France, to receive large transatlantic and other ocean-going vessels bound for La Rochelle. It consists of an inner basin 28½ acres in extent and an outer harbor protected by two moles, each 1,380 feet long.

Palliobranchiata, the name formerly applied to the class of brachiopodous Mollusca from the belief that the pallium or mantle lining the shell formed the chief organ of respiration.

Palliser, Sir William, a British military officer; born in Dublin, Ireland, June 18, 1830. He entered the army as a cavalry officer; in 1863 invented the chilled shot that bears his name, and a system of strengthening cast-iron ordnance by the insertion of a steel tube. He retired in 1871, and died Feb. 4, 1882.

Palliser Projectiles, in ordnance, cylindrical missiles, chilled at their points by being cast in molds of which the lower part is of iron, the upper part filled with the usual casting sand. Thus the point, being rapidly cooled, is intensely hard, but the rear part of the projectile is of ordinary cast iron. They are made with a small cylindrical hollow inside, closed

Pallium

with a screw plug. When used as shells, this hollow is filled with a small bursting charge of powder, enclosed in a serge bag. They do not require a fuse, but explode on striking a hard object owing to the heat generated by the collision.

Pallium, a square woolen cloak, much resembling the chlamys, from which it can only be distinguished by its greater length and amplitude. It was capable of enveloping the entire person, which it could cover at night as a blanket. It was much worn by the Greeks, corresponding to the toga of the Romans. It was sometimes decorated, with embroidery, but generally had only a simple border. In ecclesiology, a pall; an ornamental band of white wool three fingers broad, to be worn around the shoulders, with pendants a span in length before and behind, the ends ornamented with red crosses. It is sometimes said to correspond to the ribbon or garter of secular knighthood. If so, it cannot be mediæval knighthood, for Tertullian has a treatise "On the Pallium." In the time of Gregory VII. (1073-1885) archbishops went for it to Rome; afterward the Popes sent it to them when they received



PALLIUM.

their appointment. About 1370 Gregory XI. issued a decretal which rendered it imperative on an archbishop to have received the pallium before he could call a council, consecrate a bishop, or discharge other functions of his office. In zoölogy, the mantle of a bivalve mollusk.

Palm (*Palmæ* or *Palmaceæ*), a natural order of endogenous plants, the products of which are of extreme importance and utility to man. They are arborescent, with erect stems, usually slender as compared with the extreme height to which some of the species attain, and simple or rarely branching; some are stemless, their leaves springing direct from the ground; others are sarmentose, twining about the stems and branches of neighboring trees, by means of hooks or prickles, or trailing on the ground with stems of almost incredible length and extreme slenderness, as in the case of many of the Calami. Externally the stems are hard and horny, often coated with a siliceous deposit hard as flint, and finely polished; they frequently are armed with spines, and marked with the scars of dead leaves, or clothed in the upper part with the remains of the dead leaf stalk enveloped

Palm

in masses of fiber. The interior of the stem is generally soft and pithy, intermingled with bundles of fiber longitudinally. So soft and easily extracted is the internal substance of the stems of many palms that the outer hard case may readily be formed into a cylindrical tube. The leaves vary much in form superficially, but all the variations belong to two types—the fan veined and the pinnate-veined. In the former the general outline is that of a fan, with veins arising from the top of the leaf-stalk and radiating like the ribs of a fan. In the other type the leaves are more or less elongated, with a distinct midrib extending to within a little of the extremity of the blade, which is always there cleft



PALM: HYPPHAENE THEBAICA.

in two down to the point of the midrib, and with the veins springing from the sides of the midrib like the pinnules of a feather. Leaves of this type are sometimes entire, but more generally pinnate, and impart much elegance and grace to the figure of the particular species to which they belong. The size of palm leaves varies extremely, some being only a few inches in length, as in some species of *Malortia*, while in *Manicaria saccifera* they attain the enormous proportions of 35 feet in length by 5 or 6 feet in breadth. The inflorescence is a simple or many branched spadix enclosed in a spathe of one or several valves. The flowers are small individually, but numerous, usually of a yellow tint, and in some species powerfully odorous. They are unisexual, bisexual, or polygamous, the

Palm

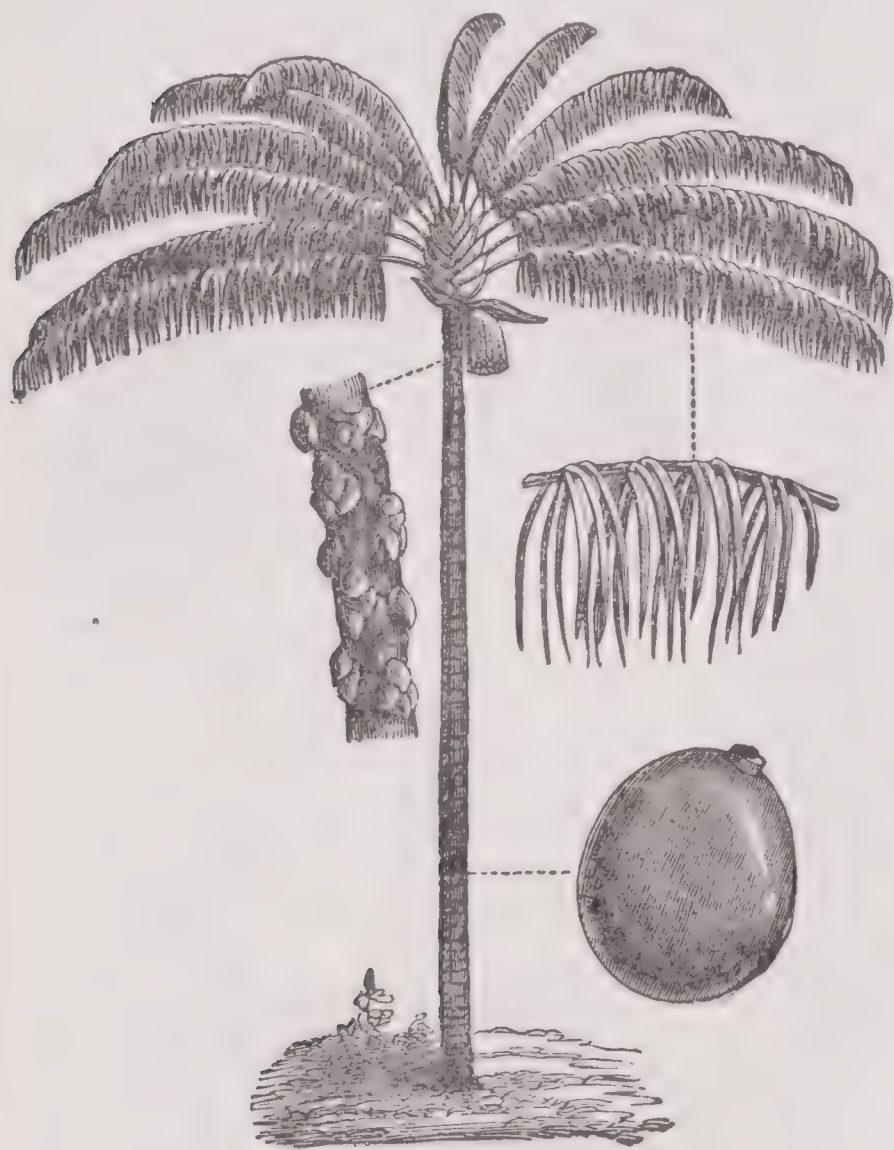
male and female flowers being borne in some species on different plants. The fruit when ripe is berry-like, drupaceous, plum-like, or, as in the cocoanut, nut-like.

Palms are natives chiefly of the tropical regions of the earth. A few are found in extra-tropical countries extending to lat. 36° N. in America, lat. 34° N. in Asia, and in Europe *Chamærops humilis*, which is the only indigenous species, extends to lat. 44° N.; no species are found beyond lat. 38° S. Linnaeus, whose knowledge of palms was limited to the more arborescent species, very appropriately named them the

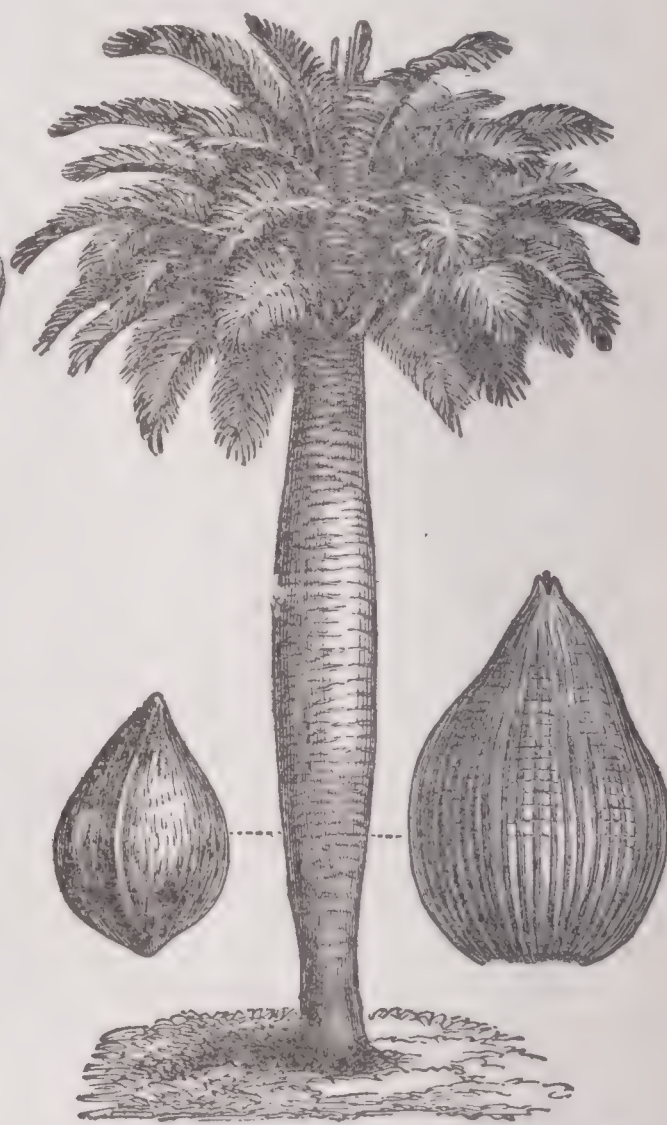
Palm

leaves, which are esteemed a delicate and delicious vegetable. Many yield by incision or otherwise an abundance of sweet sap, from which sugar, refreshing drinks, wines, spirits, and vinegar are obtained. Their leaves are used for thatch, and for the making of mats, baskets, hats, umbrellas, thread, cord, and clothing. They yield excellent and inexhaustible materials, and they are in some cases a natural substitute for writing paper, the records and writings of many Eastern peoples being inscribed upon them.

The order comprises, according to Hooker



PALM: *CENOCARPUS DISTICHUS*.



Seed.

Fruit.

PALM: *JUBÆA SPECTABILIS*.

“Princes of the Vegetable Kingdom.” Their stately habit, the elegant proportions of the stems, and the grace and beauty of the leaves of the majority of the larger species, coupled with the great variety and utility of the products of all, mark them as a most distinguished and valuable group of plants, gratifying the eye by their adornment of the landscape, and ministering abundantly to the necessities and the pleasures of both savage and civilized man. Their stems when young and tender are delicious and nutritious food; when old and mature those of certain species yield valuable farinaceous substances; some are valuable as timber trees, and the terminal bud of several consists of a mass of tender mucilaginous

and Bentham in “Genera of Plants,” between 130 and 140 genera, and the number of species known is variously estimated by different authorities at from 600 to 1,000.

The genus *Chamædorea* is composed of about 60 species, all of slender, graceful habit, their smooth stems often not exceeding an inch in diameter, though they may be 20 or more feet high. They are used in South America for making bridges, as the bamboo is in China and India. The flowers of several of the species—including those of *C. aurantiaca*—are highly esteemed as a culinary vegetable in some of the countries of Central America, but for this purpose they must be extracted from

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the spathe before it bursts. The fruit of *Leopoldina major*, called by the natives of Brazil *Jará-assu*, is collected by them and burned, and the ash, after being washed, is used as a substitute for salt. It is described, however, as being bitter rather than saline. *Euterpe edulis*—also a native of Brazil—produces fruit in size, shape, and color like that of the sloe. From the fruit of this species a beverage is made by infusion which is much relished. *E. oleracea* produces an edible and nutritious cabbage. The *Nibong* of the Malays of the Eastern Archipelago is *Oncosperma filamentosa*, the



PALM: MAXIMILIANA REGIS AND FRUIT.

cabbage of which is more highly esteemed than that of any other palm indigenous to that region. From the fruit of *Ænocarpus batava* a wholesome beverage called *Patawa-yukissé* is made on the Rio Negro. The fruit of *Oreodoxa regia*, an extremely handsome palm, a native of Cuba, is too acrid for human food, but is used there for fattening hogs.

Areca catechu is the betel-nut palm. The fruit enters into the masticatory of that name so much used in India. It contains gallic acid, much tannin, a principle analogous to catechu gum, a volatile oil, a red insoluble matter, a fatty substance, and some salts. A spurious kind of catechu is obtained from the nuts in two colors—one

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dark or black, which is extremely astringent; the other yellowish brown, which is less astringent and more pure. Besides being used as a masticatory and in medicine in cases of dysentery, the substance is employed in tanning leather and in dyeing calico. The terminal shoot of this palm furnishes an excellent cabbage, as also do several other species of *Areca*. But the true cabbage palm is *A. oleracea*, a noble species indigenous to the West Indies, attaining the height of 170 to 200 feet, with a diameter of stem of about 7 feet. The leaves are pinnate, about 20 feet long, the pinnules in



PALM: CHAMAEDORA ELATIOR.

full-sized leaves being often 3 feet in length. The terminal bud or "cabbage" is enclosed among many thin snow-white brittle flakes. It has the flavor of the almond, but with greater sweetness, and is boiled and eaten with meat. As its removal causes the death of the tree, it is regarded as an extravagant delicacy only rarely to be enjoyed, because of the great importance of the other products which the tree yields. The inflorescence is extracted from the spathes before they open, are pickled, and esteemed a delicate relish with meat. The nuts yield a useful oil by decoction. The shell or outer hard crust of the stem is employed in making gutters, and the pith yields a kind of sago if extracted immediately the tree is

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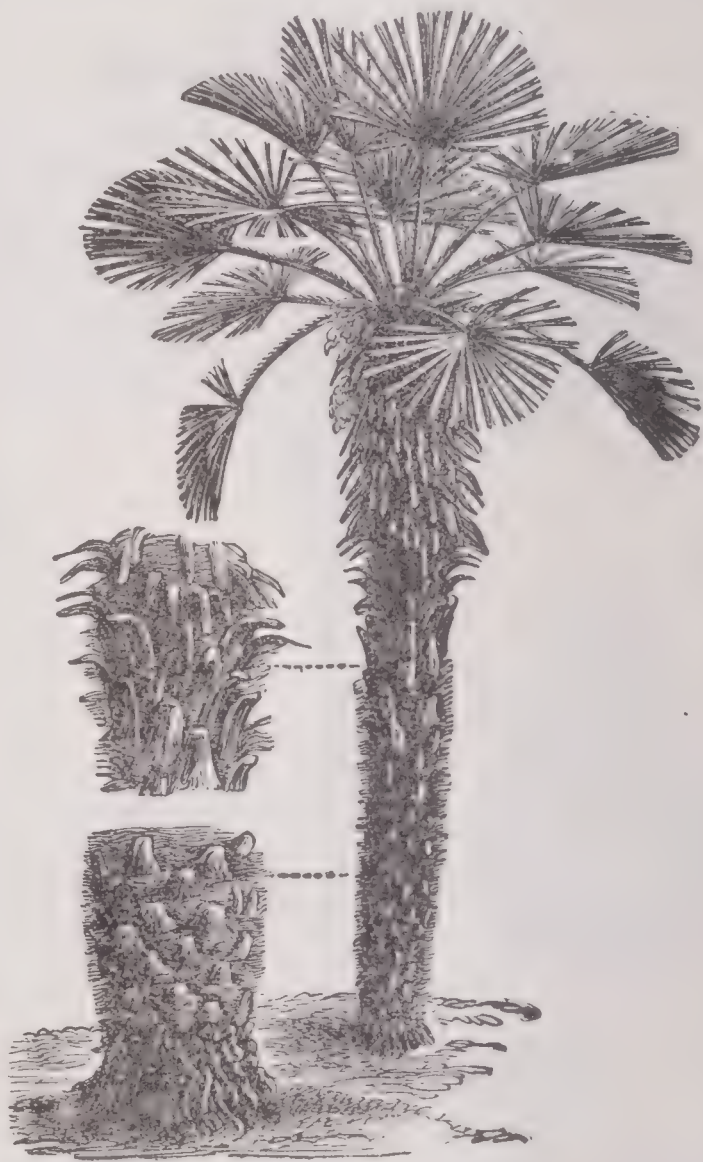
felled; but if allowed to lie and decay on the ground, it becomes the breeding ground of a peculiar grub, which is greatly esteemed as a delicate article of food in Martinique and St. Domingo.

Ceroxylon (*Iriartia*) *andicola*, a native of Peru, growing at an elevation of 8,000–10,000 feet above sea-level, is a handsome species rising to the height of 160 or more feet. The stem exudes from the annular cicatrices of the fallen leaves a resinous substance called by the inhabitants *cera de palma*. It is composed of about two parts of a yellow resin and one part of wax, the texture of which is more brittle than beeswax. A sub-resinous matter is also extracted from it named *ceroxylin*, which assumes the form of silky crystals, is soluble in alcohol, and phosphorescent by friction. The exudation, mixed with certain proportions of wax or tallow, is employed in candle making. Besides the resinous exudation the trunk yields a valuable and durable timber, the leaves are excellent and durable material for thatch, and they supply a strong, useful fiber for the manufacture of ropes and cordage. The kiziuba palm (*C. exorrhiza*) is a native of Central and South America, and is a singular and interesting tree on account of its peculiar habit of growth. The roots all spring from the stem above ground, every new root emerging from a point somewhat higher on the stem than the one which preceded it. And as the old roots decay, as the new are produced and penetrate the ground, a tree of some age presents the curious spectacle of being supported on three or four legs long enough and wide enough apart to enable a man to pass between them erect. The timber is used in flooring and for making umbrella sticks, musical instruments, etc. Blowpipes for poisoned arrows are made from the stems of *C. setigera* (see BLOWPIPE).

The sugar palm (*Arenga saccharifera*) is a native of the Moluccas, Cochin-China, and the Indian Archipelago, and is of immense value to the natives of these countries on account of its various products. It yields an abundant sweet sap, from which a chocolate-colored sugar named *jaggery* is made. The sap fermented makes an intoxicating drink variously named by the inhabitants of the different countries *neroo* or *brum*. From the pith of the stem sago is obtained in great quantity, a single stem yielding as much as from 150 to 200 pounds. The leaves supply *Gomuto* fiber, which is celebrated for its great strength and durability when formed into cordage and ropes, and at the base of the leaves a fine woolly material, named *baru*, is developed in mature trees, which is employed in caulking ships, stuffing cushions, and making tinder.

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Caryota urens, one of the noblest palms of India, yields some remarkable products. The flesh of the fruit, which resembles a plum in size and structure, is very acrid, and corrodes and burns the lips and mouth. From the terminal bud a sweet watery liquor is obtained, which, when boiled, yields *jaggery*. The terminal bud is also eaten as a cabbage. From the pith of the stem sago is obtained, which is made into bread, and prepared in various other ways, and is a valuable article of food to the natives. The tree is named *Evim-pannah* in Malabar and *Kibbul* in Singhalese, and the fiber



PALM: CHAMAEROPS HUMILIS.

called *Kittul* is obtained from its leaves.

The genus *Calamus* and its immediate allies are regarded as forming a connecting link between the palms and the grasses, having the inflorescence and fruit of the former and in some cases the habit of the latter. Certain species—viz. *C. Roxburghii*, *C. Royleanus*, both of which are included in *C. rotang* by some authors, and *C. viminalis* and others—furnish the rattan canes employed in making ropes and cables, chair bottoms, couches, baskets, mats, etc. The walking sticks known as Malacca canes are made from the stems of *C. scipionum*, a species which grows not in Malacca, but in Sumatra, and the canes

are chiefly exported from Siak in that island. The stems of the great rattan (*C. rudentium*) and others are of prodigious length, extending to hundreds of feet, clinging by hooks attached to their leaves to the trunks and boughs of neighboring trees, or trailing on the ground. They are extremely hard externally, and usually smooth, with a dense siliceous crust on the surface. *C. draco* furnishes the finest quality of the resinous substance known as "dragon's blood," though a similar substance is obtained from various other plants. In this case it is exuded from the surface of the fruit, and is separated from it by rubbing or shaking the fruit together in a bag. An

singular of palms is *R. tædigera*, an inhabitant of the banks of the Amazon. The trunk of the tree is short, from 6 to 10 feet high, but from the summit the leaves rise almost perpendicularly to the height of 40 feet or more, arching gracefully outward toward the apex. The footstalk of these enormous leaves alone are often 12 or 15 feet long by 4 or 5 inches in diameter. The integument of these footstalks is thin, extremely hard and elastic, and light as a quill, and, being easily split into straight strips, is made into window-blinds, baskets, etc., by the Indians.

The true "sago" of commerce (see SAGO) is derived from various species of



SAGO PALM, *CYCAS REVOLUTA*.

inferior quality of the same substance is also obtained from the tree by incision of the stem, and by steaming the fruit after the natural exudation has been collected. The species are very numerous, about 200 having been described, but few are more singular than *C. adspersus*, which resembles a creeping or twining grass rather than a palm, the stems rarely exceeding in thickness stout wheat straw. *Zalacca edulis* is regularly cultivated by the Burmese for the sake of its pleasantly acidulous fruit, which grows to the size of a walnut. The succulent scaly pulp which encloses the seed is the edible part. *Raphia vinifera*, a native of Guinea, yields a rather abundant sap, from which a strongly spirituous wine is obtained. One of the most beautiful and

the genus *Sagus*, though other species of palms, as has already been stated, and also plants widely different botanically, such as *Cycas revoluta*, also yield a kind of sago. *S. Rumphii*, *S. lævis*, and *S. farinifera* are the species from which the largest quantity of true sago is obtained. *S. Rumphii* is a native of the Indian Archipelago, Malacca, Borneo, Sumatra, Celebes, and the Moluccas being the principal places in which it is cultivated. The tree is small, rarely exceeding 30 feet in height of stem, which consists of a hard shell about 2 inches thick enclosing a mass of spongy pith — the sago. This pith is gradually absorbed after the tree reaches maturity, leaving the stem quite hollow. The proper time to fell the trees, before the pith begins to diminish in

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bulk or quality by absorption, is indicated by the upper leaves becoming covered with a sort of farina or white dust. When felled the stem is cut into lengths of 6 or 7 feet, which are split, the better to remove the pith. There are various modes of extracting the fecula from the insoluble substances with which it is combined in the stem, but washing and straining are the principal features of every process. A single tree, it is said, will yield from 500 to 600 pounds of sago. The bache (*Mauritia flexuosa*), a native of Guiana, supplies the chief wants of the people wherever it grows; the stems furnish timber for building their dwellings, the leaves thatch for the same, and material for mats, couches, hammocks, etc.; the pith yields sago; the juice by fermentation gives an excellent beverage; the kernels of the fruit are ground into meal and made into bread; and the fiber is converted into cordage and clothing. The Palmyra palm (*Borassus flabelliformis*) is one of the most common of its tribe in India. In some parts of the country it grows spontaneously, and it is found as far N. as 30°; in others it is the subject of careful cultivation. It furnishes the greater part of the palm wine of India, which by the natives and Famuls is called *Callu* and *Noong-poo*, and by the Europeans toddy. The fruit is about the size of a child's head, somewhat triangular, and within a thick, fibrous rind contains three seeds about the size of a goose's egg. The seeds when young are eaten by the natives, being jelly-like and palatable. The toddy is obtained by wounding the spathe before the inflorescence expands. After a few days a clear, sweet liquor exudes from the wound, and is carefully collected in pots suspended under the wounded spathe. A tree yields about three quarts daily. The liquor is drunk fresh, and will only keep sweet for about three days, when it undergoes fermentation and becomes sour, and is distilled into *arrack*. *Jaggery* is also made from the juice. The young plants when a few inches high are cooked and eaten as a vegetable. The leaves, which are fan-shaped and large, are turned to the various uses alluded to in connection with species already described, and in India they are almost universally used for writing upon with an iron stylus.

The double cocoanut, or sea cocoanut as it has been called, is *Lodoicea seychellarum*. The nuts of this tree are seen occasionally in museums and in the cabinets of collectors of curios, often beautifully polished and carved by native workmen, and formed into caskets and other ornaments. For years their origin was shrouded in mystery. They were frequently found floating about in the ocean before the discovery of the tree, and an absurd belief was entertained by Malay and Chinese sailors that they were the fruit of

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some marine tree. The tree, a native of the Seychelle Islands, is very beautiful, attaining a height of from 50 to 80 feet, with leaves 20 feet long supported on stalks of equal length. The fruit is one of the largest produced by any of the palms, being a foot or a foot and half in length. The kernel near the base is divided into two parts—hence the name double cocoanut—and while young part of the fleshy substance in which it is enclosed is edible. The chief products of the tree are timber and fiber for cordage, and a downy kind of fiber which envelops the young leaves is used for filling mattresses and pillows.

The Talipat palm of Ceylon (*Corypha umbraculifera*) is notable only for the variety of uses to which its leaves are put in Ceylon and other parts of India to which it is indigenous. The leaves are of immense size, and, being palmate with the leaf-stalk attached near the middle, they are readily formed into umbrellas and tents; the cane-like ribs being removed and the blades neatly stitched together, they may be folded up with great facility. They are also very much used for the books or *colahs* of the inhabitants. Many of these alleged to be made of Egyptian papyrus are formed of the leaves of this palm. The tree grows to the height of 100 feet, and has an imposing appearance. A closely allied species (*C. taliera*) is the Talipat palm of the Indian peninsula. It grows to about the same height as the preceding species, with leaves of a more durable kind for the purposes of thatch, but not so adaptable to more delicate and artistic uses. *Licuala peltata* is the Chittah-pat of Assam, the leaves of which are extensively used for making umbrellas, punkahs, and hats. The stems of *L. acutifolia* are made into walking sticks, named by Europeans "Penang Lawyers." *Copernicia cerifera*, a native of Northern Brazil, produces an edible fruit; and from the leaves, after they have been removed from the trees and dried, is obtained an inferior kind of vegetable wax, which is used in candle making and to adulterate beeswax.

Of the American palmetto palm, a native of the Carolinas and Florida, the most important species is the cabbage palmetto (*Sabal palmetto*), which sometimes grows to 50 feet in height and 15 inches in diameter, with leaves 5 feet long and broad. It is found also in the Bermudas. Its products are timber and the leaves, the former being exceedingly durable, very porous, and especially valuable for wharf building, as it resists water and is not attacked by the teredo. The fruit is not edible. The palmetto of Europe is *Chamærops humilis*, which inhabits the countries on both shores of the Mediterranean, occupying great tracts. It rarely

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reaches 10 feet in height, and usually is much less, its growth being exceedingly slow. The leaves are fan shaped and abound in excellent fiber, with which the Arabs, combining it with camels' hair, make tent covers; in Spain it is made into ropes and sailcloth, and in France into carpets, named African haircloth. The French in Algeria make paper and pasteboard of it, and so well adapted is it to this purpose that its use might be more extended in other countries. The fruit is edible, and is eaten by the Arabs and the inhabitants of Sicily and Southern Italy. *C. Ritchiana*, a native of Scinde and Afghanistan, and *C. excelsa*, a native of China and Japan, both produce excellent fiber. The leaves of *Thrinax argentea* supply the material called "chip," of which ladies' hats and bonnets of that name are made. The trunks of *T. parviflora*, a native of Jamaica, though of slender diameter, are said to be very suitable for piles and marine buildings subject to immersion, as they are impervious to the influence of water, and are not attacked by borers or worms. *Sabal* (*Trithrinax*) *mauritiæformis*, a native of New Granada, is a low-growing but very handsome palm, not remarkable for any products of special utility.

The *Piritu* of Venezuela, the *Paripou* of Guiana, and the *Papúnba* of the Amazon are the local names of one species of palm — *Gulielma speciosa*. It produces fruits somewhat triangular in shape, about the size of an apricot, and bright reddish yellow in color. They have a peculiar oily flavor, and are eaten boiled or roasted, when they resemble chestnuts. They are also ground into meal, which is baked in cakes. The Great Macaw tree of the West Indies (*Acrocomia sclerocarpa*) is a native of Jamaica, Trinidad, and the adjacent islands and continent. In Brazil it is called *Macahuba*, and in Guiana *Macoya*. The tree grows from 20 to 30 feet high, with a crown of leaves, each of which measures from 10 to 15 feet in length. The fruit yields an oil of yellow color, sweetish taste, and having the odor of violets, which is employed by the natives as an emollient for painful affections of the joints; and in Europe it is used in the manufacture of toilet soaps. The nuts are capable of receiving a high polish, and are converted by the natives and the negroes into ornaments. The Tucum palm (*Astrocaryum tucuma*), a native of the Rio Negro and the Upper Amazon, yields a very superior fiber, the cordage from which is knitted into hammocks, which are in great demand with the Brazilians. The fleshy outer covering of the fruit is eaten by the natives. The Murumuru palm (*A. murumuru*) produces a very agreeable fruit with the fragrance of musk. Cattle eat the fruit with avidity, but evacuate the hard stony seeds undigested. In times of scarcity

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these seeds are carefully collected and used to feed pigs, which are very fond of them, and find no difficulty with their powerful teeth and jaws in masticating them. *Attalea funifera* furnishes the whalebone-like fiber now so much used for making brooms and brushes. The tree attains the height of 20 or 30 feet. At the base of the leaves, which are used for thatching, the fiber known in commerce as piassava fiber, para grass, and monkey grass is produced. It is employed in the countries in which it grows to make coarse but strong and durable cables, but is unfit for any finer purpose. The fruit is the well-known Coquilla nut, much used in turnery for the making of knobs to walking sticks and umbrellas, handles to bell pulls, etc. The nuts are extremely hard and susceptible of a fine polish, and exhibit a beautifully mottled surface of light and dark brown. The fruit of *A. cohune* yields from its kernel a valuable oil called cohune oil, which is said to be superior in quality and to burn twice as long as the best cocoanut oil. It is a native of Honduras and the Isthmus of Panama. The trunk, which attains the height of about 40 feet and is crowned with leaves some 30 feet long, yields by tapping a kind of palm wine. The palm oil of Africa is the product of the fruit of *Elæis guineensis*. The tree is cultivated now in the West Indies and tropical South America for the sake of the oil. It attains a height of 60 to 80 feet, with a spreading crown of pinnate leaves, each about 15 feet long, the footstalks of which are armed with stout hooked spines. The flowers have a strong, peculiar smell, like anise and chervil in combination. The fruit forms a large head, consisting of a great number of bright orange-colored drupes; when ripe each drupe has an oily pulp with a stone or kernel in the center, and it is from this pulp that the oil is obtained. To extract the oil the pulp is first bruised to a paste in wooden mortars, and is then boiled in water. The oil which rises to the surface of the water is reddish or orange in color, and has an agreeable odor of violets; it is allowed to cool, and is then skimmed off. In warm countries it retains its oily consistence, but in cooler climates it acquires the solidity of butter. It is used by the natives universally as butter is in Europe. The quantity of palm oil now exported is enormous. It is employed in the manufacture of candles, toilet and common soaps, and as a lubricant of railway carriage wheels, etc. It is composed of about 31 parts of stearin and 69 of olein. The tree yields from its trunks abundance of palm wine. The *Coquito* of Chile is *Jubæa spectabilis*, a tree of about 50 feet in height, with a spreading crown of leaves. From its trunk a syrup is contracted, called *miel de palma*, which is much esteemed by the Chileans and Europeans in

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cooking in various ways. It is obtained by cutting down the tree and lopping off its crown of leaves, when the sap flows from the wound, and is carefully collected. By cutting off a fresh slice from the wound daily, or when the flow of sap becomes weak, it may be kept flowing for several months; a good tree is said to yield as much as 90 gallons of sap, which on being boiled down assumes the consistence of treacle.

Palm, a linear measure equal to the breadth of the hand, or to its length from the wrist to the tip of the fingers; a measure of length described variously as three and four inches; among the Romans a measure of length equal to about eight and one-half inches.

Palm, Johann Philipp, a bookseller of Nuremberg, who acquired historic celebrity as a victim of Napoleonic tyranny in Germany; born in Schorndorf, in 1768. In the spring of 1806 a pamphlet entitled "Germany in its Deepest Humiliation," which contained some bitter truths concerning Napoleon and the conduct of the French troops in Bavaria, was sent by his firm to a bookseller in Augsburg in the ordinary course of trade. The book fell into the hands of Napoleon's officers; they made the emperor acquainted with it. He ordered Palm, as the publisher, to be arrested, tried him by court-martial, and shot him at Braunau, Aug. 26, 1806. This murder greatly incensed the German people against the French.

Palma. (1) The capital of the island of MAJORCA (*q. v.*) and of the Balearic Islands, on the Bay of Palma, on the S. coast. The cathedral, a Gothic edifice (1322-1601), contains the tomb of King Jayme II. of Aragon and a valuable collection of church ornaments. The tomb of Raymond Lully is in the church of St. Francis. There are, further, a beautiful exchange (1426-1446), an old Moorish palace, and a 16th-century town hall, with pictures. Palma is one of the most aristocratic cities in Europe. Its inhabitants weave silks and woollens, make jewelry, and various articles of common use. The port is protected by a mole, and the town by a wall and batteries. The commerce reaches a total value of about \$8,000,000 per annum. Pop. 63,937. (2) A town of Sicily, 14 miles S. E. of Girgenti. Pop. 11,702. (3) The name of one of the larger of the Canary Islands.

Palma Christi, a name frequently applied to the castor oil plant.

Palma, Jacopo, commonly called PALMA VECCHIO (*i. e.*, Old Palma), an Italian painter; born in Serinalta, near Bergamo, about 1480. At first working under the influence of the Bellinis, he subsequently painted in the spirit and style of Giorgione and Titian, and may be placed at the head of the second class of great Venetian ar-

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tists. His pictures are either sacred subjects or portrait groups. Of the former the best are a series of six figures of saints, St. Barbara and others, in the church of St. Maria Formosa at Venice. The best portrait group is three sisters, generally called the "Three Graces." He died in Venice, in 1528. His brother's grandson, likewise called JACOPO (1544-1628), and nicknamed IL GIOVANE (the younger), painted religious pictures of greatly inferior merit, though he modelled his style on that of Titian, Palma, Vecchio, and Tintoretto. Except for eight years in Rome, he spent all his life at Venice.

Palma, Tomas Estrada, a Cuban statesman and soldier, called the "Franklin of Cuba"; born in Bayamo, Santiago de Cuba, July 9, 1835. He was educated at Havana; subsequently studied law at the University of Seville, Spain, and after his graduation



TOMAS ESTRADA PALMA.

returned to his native place. Realizing that under the Spanish rule there was little opportunity for the administration of justice in Cuba, he abandoned the idea of practising his profession and devoted himself to the management of his estate. When the first suggestion of uprising was heard in 1865 he became interested and in 1867 threw himself into the conspiracies which had independence for their object. His ability and social eminence soon made him a leader, and he became the bosom friend of such men as Cespedes and Aguilera, the first president and first vice-president. When Cespedes raised the standard of revolt, Oct. 10, 1868, Palma freed his slaves, raised all he could from his tax-drained estates and aided the movement to the utmost. He took the field and his devoted mother shared the dangers of camp life with him. During his absence, one day, his detachment was surprised by the Span-

ish and his mother captured. She was compelled to walk behind the troops till she fell from exhaustion, and was abandoned in the woods, where her son found her, two weeks later, starving. She died in three days, and her son became more than ever devoted to the cause of liberty.

After the capture of Bayamo, which quickly followed the outbreak of the war, Palma was elected to the Cuban assembly and became secretary of the republic under the presidency of Spoturno. On the resignation of Spoturno, the Cuban Assembly elected Palma president, March 29, 1876. He performed the duties of the office with ability, but was, through the treachery of a Cuban, captured by a force of Spanish soldiers while on a journey. He was first taken to Havana and imprisoned for five days in Morro Castle. Here every effort was made to induce him to take the oath of allegiance to Spain; but he was proof against all temptations and bribes, and refused every offer. He was then sent to Spain and imprisoned for a year in the castle of Fieuras. On the subsequent surrender of the revolutionists he was set at liberty and went first to Paris, and from there to New York. Later he went to the republic of Honduras, where he began work as a schoolmaster and became postmaster-general. He there married the daughter of President Guardiola and returned to the United States, where he settled in Orange co., New York. In July, 1895, he was elected delegate or president of the Associated Cuban clubs in the United States, to fill the vacancy caused by the death of José Martí. In September of the same year he was made minister or delegate plenipotentiary abroad of the republic of Cuba, and became the means of procuring substantial aid for the revolutionists. On Dec. 31, 1901, he was elected first president of the new Cuban republic. He was reelected in 1906, but resigned in the same year. He died in Santiago de Cuba Nov. 4, 1908. See CUBA; SPANISH AMERICAN WAR.

Palmas, Cape, a headland of Western Africa, on the Guinea coast, lat. $4^{\circ} 22' 6''$ N., lon. $7^{\circ} 44' 15''$ W. There is a lighthouse with a fixed light, and the adjacent harbor, which is the only one between Sierra Leone and Benin, is spacious, secure, and protected by a reef from the swell of the ocean.

Palmblad, Vilhelm Fredrik, a Swedish historian; born in Liljested, East Gothland, Dec. 16, 1788. He studied at Upsala, and became Professor of Greek in the same university in 1835. Among his works (which deal with geography, history, and classical philology) are the "Biographical Dictionary" (23 vols. 1835-1859) and the historical novel "Aurora Koningsmark" (1847). He died Sept. 2, 1852.

Palmeirim, Luiz Augusto (päl-mī'rēm), a Portuguese poet; born in Lisbon, Portugal, Aug. 9, 1825. His first collection of lyric verse, "Poesies" (1851), reached a 5th edition in his lifetime, and won for him the title "the Béranger of Portugal." Among his patriotic poems, "Exiled" is the one best known. His lyrics have been published as "Popular Songs." He wrote also some comedies in verse; a "Gallery of Portuguese Portraits" (1878); and "The Eccentrics of my Time" (1891). He died in Lisbon, Dec. 4, 1893.

Palmelleæ, or Palmellaceæ, in botany, a sub-order of *Confervaceæ*, or greenspored algæ. The cells are somewhat globose or elliptical, free, and more or less distinct, or collected by means of a slimy layer into a frond. They grow in damp places, in fresh water, or in the sea. Tribes, *Protococcidæ* and *Coccochloridæ*, the latter containing the typical genus *Palmella*.

Palmer, a pilgrim who had performed the pilgrimage to the Holy Sepulcher, and had returned, or was returning home after the fulfillment of his vow. The Palmers were so called from their carrying branches of the Oriental palm, in token of their accomplished expedition. On arriving at their home they repaired to the church to return thanks to God, and offered the palm to the priest, to be placed upon the altar.

Palmer, Alonzo Benjamin, an American physician; born in Richfield, N. Y., Oct. 4, 1815. He studied medicine in New York and Philadelphia. In 1852 he was chosen to the chair of anatomy in the Medical School of the Michigan University. Two years later he took the chair of materia medica, and in 1860 he was appointed Professor of Pathology and the Practice of Medicine, which position he held for many years. He added to his duties others at the Berkshire Medical College in Massachusetts, in 1864, and at Bowdoin College, Maine, in 1869. The position at the latter college he held at the time of his death, in Ann Arbor, Mich., Dec. 23, 1887.

Palmer, Arthur Hubbel, an American educator; born in Cleveland, O., June 30, 1852; was graduated at Western Reserve College in 1879; Professor of the German Language and Literature at Adelbert College in 1883-1891; librarian of the college in 1886-1891; and was called to the chair of German language and literature at Yale in 1891. He edited Schiller's "Wilhelm Tell" (1898), "Thirty Years War" (1899), and Goethe's "Herman and Dorothea."

Palmer, Erastus Dow, an American sculptor; born in Pompey, N. Y., April 2, 1817. His most famous works are "Morning and Evening"; "The Infant Ceres";

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"Peace in Bondage"; "The Angel of the Sepulcher"; "The White Capitol"; and the statue of Robert R. Livingston, in the National capitol. He also painted several portraits. He died March 9, 1904.

Palmer, Sir Charles Mark, an English shipbuilder; born in South Shields, Nov. 3, 1822. In 1851 he conceived the idea of cheapening the transit of coal to London and other ports by the employment of steam collier vessels, which have since completely superseded the old sailing brigs of the N. of England. He established the shipbuilding yard at Jarrow on the Tyne, where the first screw collier, the "John Bowes," was launched in 1852. He developed the Jarrow works into the gigantic concern, now Palmer's Shipbuilding and Iron Company, Limited, which constructs an ocean steamer from the iron ore of its own Yorkshire mines, through all its processes into a complete ship. From these works the populous modern town of Jarrow originated. It obtained a charter of incorporation in 1875. The Jarrow works have produced armor-plated and other vessels for the English navy, and Sir Charles was the first to introduce rolled plates for men-of-war. He was created a baronet in 1886. He died June 4, 1907.

Palmer, Courtlandt, an American lawyer; born in New York, in 1843. He will be best remembered as the founder of the "Nineteenth Century Club," a debating society devoted to the discussion of social, literary, artistic, theological, and scientific problems, and whose sessions were held at his house in Gramercy Park. His own opinions on all these topics were extremely liberal. He died in New York, in 1888.

Palmer, Edward Henry, the "Sheikh Abdullah," an English Orientalist; born in Cambridge, England, Aug. 7, 1840. While a schoolboy in Cambridge he picked up Romany (the gipsies' tongue); while a clerk in the city, Italian and French. In 1860 at Cambridge he began to devote himself to Oriental studies—Arabic, Persian, and Hindustani; in 1863 obtained a sizarship at St. John's; and in 1867, graduating with a third-class in classics, was elected a fellow of his college. During 1868–1870 he was engaged for the Palestine Exploration Fund in the survey of Sinai, and, with Charles Tyrwhitt Drake, of the Desert of the Wanderings, acquiring meanwhile a marvelous knowledge of the wild Arab tribes. In 1871 he was appointed Lord Almoner's Professor of Arabic at Cambridge; and in 1874 he was also called to the bar. In 1881 he turned London journalist, writing principally for the "Standard." Finally, in June, 1882, on the eve of Arabi's Egyptian rebellion, he was selected by the government for the perilous mission of winning over the Sinai tribes to Great Britain

Palmer

and hindering the destruction of the Suez Canal. He made two expeditions—the first his great ride from Gaza to Suez (July 15–31), and the second when, starting from Suez with Captain Gill, R. E., and Lieutenant Charrington, R. N., he and they Aug. 11 were betrayed and murdered in the ravine of Wady Sudr.

Palmer, George Herbert, an American educator; born in Boston, Mass., March 19, 1842; was graduated at Harvard in 1864; studied at the University of Tübingen in 1867–1869; was assistant Professor of Philosophy at Harvard in 1883–1889; and in 1889 became Professor of Natural Religion, Moral Philosophy and Civil Polity there. He wrote "The New Education" (1887), etc., and translated several classical works.

Palmer, John McAuley, an American lawyer; born in Eagle Creek, Scott co., Ky., Sept. 13, 1817. His boyhood was spent on his father's farm in Christian co., Ky. In 1831 his parents removed with him to Madison co., Ill. In 1841 he was admitted to the bar, and in 1843 was elected probate judge of Macoupin co., Ill.; in 1847 was elected a member of the constitutional convention, and in 1849 county judge of Macoupin county. He was elected to the State Senate in 1852, and reelected in 1854. He presided over the Republican State Convention in 1856, and represented the party in the National Convention in which John C. Fremont was nominated. He made an unsuccessful canvass for Congress in 1859, and was chosen elector on the Lincoln ticket in 1860. In 1861 he was State delegate to the peace congress in Washington. He entered the army in 1861, and served with distinction, retiring in 1866 with the rank of Major-General, U. S. A. He then settled in Springfield, Ill., and resumed his civil career. In 1868 he was elected the 16th governor of Illinois, and served four years from January, 1869. In 1872 he returned to the Democratic party and supported Greeley for President. He was one of the Democratic visitors to Louisiana after the presidential election of 1876; was nominated by the Democrats in the Legislature in 1877 and twice afterward as their candidate for United States Senator, without, however, being elected; was delegate-at-large to the National Democratic convention in 1884, and was nominated by the Democratic State convention for governor in 1888 and defeated. In 1890, by an innovation in politics, the Democratic nomination for United States Senator was made by the State convention, and fell on General Palmer. In 1896 he was the candidate of the Gold Democrats for President of the United States. His term as senator expired March 4, 1897. He died in Springfield, Ill., Sept. 25, 1900.

Palmer

Palmer, John Williamson, an American author; born in Baltimore, Md., April 4, 1825. In 1870 he settled in New York; subsequently was connected with the staff of the "Century Dictionary." Among his writings are: "The Golden Dagon; or, Up and Down the Irrawaddi" (1853); "The New and the Old; or, California and India in Romantic Aspects" (1859); "After His Kind, by John Coventry," a novel (1886); and "Stonewall Jackson's Way," which was one of the most popular ballads of the Civil War. He died in Baltimore, Feb. 26, 1906.

Palmer, Joseph, an English writer; born in 1756. He wrote: "A Fortnight's Ramble to the Lakes," etc. (1782); "Half-Pay," a narrative poem; "The Lancashire Collier Girl" (1795); "Siege of Gibraltar" (1795), a poem; "Windermere" (1798), a poem. He died in Eastbourne in Sussex, Sept. 4, 1815.

Palmer, Julius Aubeineau, an American author; born in Massachusetts, in 1840. Among his works are: "One Voyage and Its Consequences" (1889); "About Mushrooms" (1894); "Memories of Hawaii" (1894); etc. He died in 1899.

Palmer, Lynde. See PEEBLES, MRS. MARY LOUISE.

Palmer, Mary, an English writer, niece of Sir Joshua Reynolds; born in Plympton Earl's, Devonshire, England, Feb. 9, 1716. She wrote "A Devonshire Dialogue," the best piece of literature in the Devon dialect. She died in Great Torrington, May 27, 1794.

Palmer, Ray, an American clergyman and hymnologist; born in Little Compton, R. I., Nov. 12, 1808; was graduated at Yale in 1830, and entered the Congregational ministry; was secretary of the Congregational Union in New York city in 1866-1878; wrote many sacred poems, but will always be remembered by the hymn, "My Faith Looks Up to Thee," which is included in all collections of Church hymns and has been translated into more than 20 languages. He died in Newark, N. J., March 29, 1887.

Palmer, William, an English theologian; born in Mixbury, Oxfordshire, England, July 12, 1811. He was a clergyman of the Established Church, but seceded to Rome in 1855. He was a voluminous writer. Among his works are: "Short Poems and Hymns" (1843); "Remarks on the Turkish Question" (1858); "Introduction to Early Christian Symbolism" (1859); "Egyptian Chronicles" (1861); "Commentary on the Book of Daniel" (1874). He died in Rome, April 4, 1879.

Palmer, William Pitt, an American poet; born in Stockbridge, Mass., Feb. 22,

Palmerston

1805. He wrote many poems, some of which became famous; among them are the "Ode to Light" and "Orpheus and Eurydice." He died in Brooklyn, N. Y., May 2, 1884.

Palmerston, Henry John Temple, Viscount, an English statesman; born in 1784. In 1807 he was named a lord of the Admiralty under the Tory administration of



LORD PALMERSTON.

the Duke of Portland. In 1809 he was appointed Secretary of War, and in this office he remained through the various Tory administrations for nearly 20 years. But in this interval his political views had undergone considerable modification, and in 1828 he retired from the Wellington administration. After the fall of the Conservative ministry of Sir Robert Peel, in the following year, Lord Palmerston again resumed his functions in the Foreign Office. He remained in office till 1841, and it was during these six years that the name of Palmerston became so celebrated as a foreign minister. Between the years 1841-1846, he was in opposition to the Conservative ministry of Sir Robert Peel; but in the last mentioned year he was again appointed Foreign Secretary under the Whig administration of Lord John Russell. His ready acknowledgment of the coup d'état effected by Louis Napoleon in 1851, led to serious differences between himself and his colleagues, and, in consequence, he was compelled to resign. His secession, however, speedily led to the fall of the Russell ministry, and on the accession of the Coalition administration, in the following year, he took the office of House Secretary. The mismanagement of affairs in the Crimea brought about the fall of the Coalition ministry in 1855; immediately after which

Palmer Worm

Lord Palmerston reached the apex of power as First Lord of the Treasury, and prime minister of Great Britain. As prime minister he successfully carried out the policy of alliance with France and the war with Russia, which ended with the fall of Sebastopol, in September, 1855. Feebly supported, however, by his colleagues, he lost strength in the House, and his administration finally fell, February, 1858, on the Conspiracy Bill. The second Derby administration succeeded, but a year later Palmerston was again called to be prime minister. With surprising energy, vivacity, and industry, almost unabated by age, he directed the English policy through the Italian war, the American war, and the Polish insurrection. He was prime minister for a greater number of years than any man in this century, except Lord Liverpool, and retained marvelous popularity to the last. He died Oct. 27, 1865.

Palmer Worm, a hairy caterpillar, wandering about like a palmer on his pilgrimage. The most common ones belong to the genus *Arctia* (tiger moth). See PALMER.

In Scripture, Hebrew *gazam*, from *gazam* = to cut off (Joel i: 4, ii: 25: Amos iv. 9), an insect which came in numbers, like a "great army," eating up (the leaves and flowers (?) of) vines, fig trees, and olive trees. Gesenius thinks it was a locust.

Palmetto, a fan palm growing in the West Indies, Bermuda, and the S. part of the United States. Its leaves are woven into hats, like those made of chip. The trunks form good stockades, and were used for the purpose during the War of Independence. Also *Chamærops humilis*, a palm from Southern Europe.

Palmetto State, South Carolina. On its coat of arms is a delineation of one of these trees, for the growth of which the State is famous.

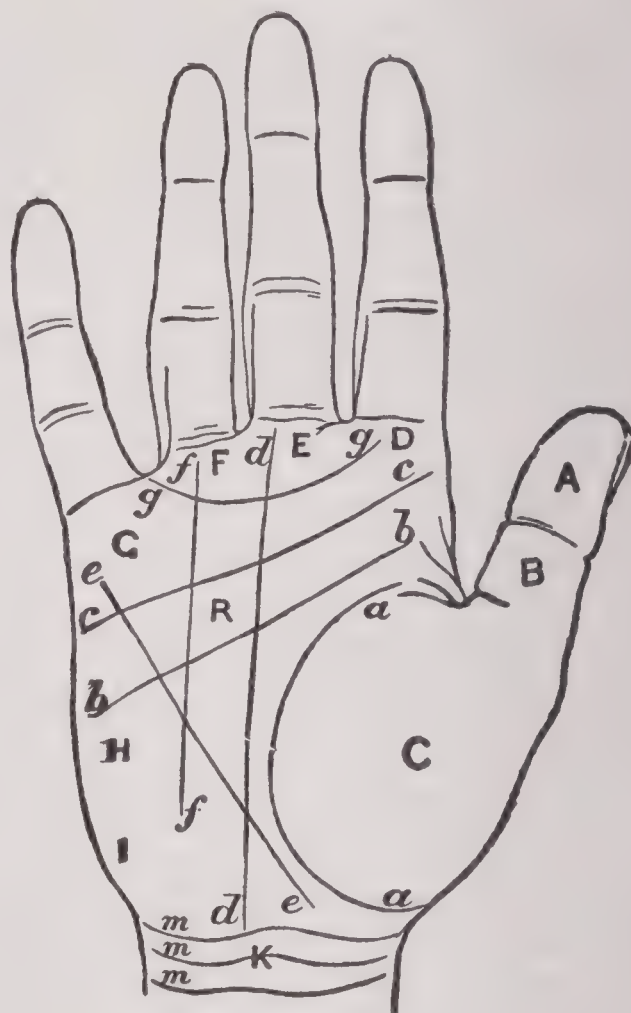
Palmieri, Luigi, an Italian meteorologist; born in Benevento, Italy, April 22, 1807, taught mathematics in several lycæums, became in 1847 professor at Naples, and in 1854 director of the observatory on Vesuvius. He invented many meteorological instruments, and wrote several works on volcanoes and seismology. He died in Naples, Italy, Sept. 9, 1896.

Palmipes, a genus of *Asteriadæ*. The body is thin, flat, and pentagonal, covered with fasciculated spines. *P. membranaceus* is the bird's-foot, sea-star, or star-fish. It is white, with the border and the rays white. It is found in the Arctic and British seas, Mediterranean, etc.

Palmistry, or **Chiromancy**, the art which professes to discover the temperament and character of anyone, as well as the past and future events of his life, from an

Palmistry

examination of the palm of his hand; and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a "science," or at least as a branch of an interpretative science of the hand in general, to which the name Chiromancy has been given. The other branch of this general science has been called Chiromancy, and is concerned with the interpre-



PALMISTRY.

A, will; B, logic; C, mount of Venus; D, mount of Jupiter; E, mount of Saturn; F, mount of Apollo; G, mount of Mercury; H, mount of Mars; I, mount of the Moon; K, the rascette; a, a, line of life; b, b, line of the head; c, c, line of heart; d, d, line of Saturn or fate; e, e, line of liver or health; f, f, line of Apollo or fortune; g, g, the girdle of Venus; R, the quadrange; m, m, m, bracelets of life.

tation of the form and character of the hand and fingers, while chiromancy treats of the palm only.

The chief authorities on palmistry in recent times are two Frenchmen—M. le Capitaine D'Arpentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. D'Arpentigny has expounded principally chiromancy, or that branch of the interpretative science of the hand which treats of the general form of the hand and fingers. The observation of the fingers and joints of the hand is quite

Palmistry

as important to the chiromant as that of the palm itself. The thumb is generally regarded as chirognomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power. What has to be considered by the chiromant proper is the "mounts" of the hand, with the marks on them, and the lines in the palm. The "mounts" are the elevations at the base of the fingers and thumb and in the "percussion" of the hand—*i. e.*, the side of the palm which extends from the root of the little finger to the wrist: it is so called because it is used in striking. They are seven in number, and are named from the planets. When well developed the mounts indicate the possession of the quality associated with the respective planets—*e. g.* Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs. There are four principal lines—viz. the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the bracelets. These last (the bracelets), if well marked, strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart (the *linea mensalis* of ancient chiromancy), if long, clear cut, and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—*i. e.* a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate, the line of Apollo, the line of liver or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line (*Cingulum Veneris*), when present, indicates a character very liable to be influenced by the passion of love. Marks on the

Palm Wax

mounts or lines, such as stars, crosses etc., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

Palmitic Acid, in chemistry, $C_{16}H_{32}O_2 = C_{15}H_{31}.CO.OH$ cetylic acid, ethalic acid or olidic acid, an acid found in nearly all animal and vegetable fats. It is obtained by saponifying palm oil with potassic hydrate, decomposing the resulting soap, and purifying the separated fatty acid by crystallization from alcohol. It is a colorless, solid body, without taste or smell, insoluble in water, very soluble in alcohol and ether, melts at 62° , and resolidifies on cooling in a mass of leafy crystals. It boils at 268.5° , under a pressure of 100 mm., and may be distilled almost unchanged. It forms neutral and acid salts called palmittates.

Palm Kale, a variety of the cabbage extensively cultivated in the Channel Islands. It grows to the height of 10 or 12 feet, and has much the aspect of a palm.

Palm Oil, palm butter; a fat obtained from the fruit of certain kinds of palm, and imported from the coast of Guinea. It has the consistence of butter, an orange color, a smell resembling violets, and consists mainly of tripalmitin, with a little olein. It is sparingly soluble in alcohol, but mixes in all proportions with ether and turpentine, melts at 27° and is bleached by heating to 100° , in presence of a current of steam and air. Palm oil is extensively used in the manufacture of soap and candles, and is a common constituent of railway-carriage grease. It is frequently adulterated with wax, tallow, lard, resin, etc.

Palm Sugar, saccharine matter obtained from the juice of various kinds of palm. It is very dark colored and hygroscopic, and consists chiefly of cane sugar.

Palm Sunday, the Sunday immediately preceding Easter. It commemorates the triumphal entry of Jesus into Jerusalem, when the multitude strewed palm "branches," or rather leaves, for the typical palms, like those of Palestine, have no branches (John xii: 13). In some Roman and High Anglican churches genuine palms are used for decorations on that day, but they are too rare and expensive for ordinary use. A substitute has therefore been found in an early flowering willow (*Salix coprea*), which is popularly called a palm.

Palm Wax, a dark yellow, somewhat translucent wax obtained from *Ceroxylon andicola*, a species of palm indigenous in the tropical regions of America. It melts at 106° , and takes fire at a higher tempera-

Palm Wine

ture, burning with a bright, smoky flame. It is soluble in ether and the caustic alkalis, partly soluble in hot alcohol, but insoluble in water and cold alcohol.

Palm Wine, an alcoholic beverage prepared by the fermentation of the juice of certain palms, *Arenga saccharifera*, *Sagus*, *Raphia*, and others.

Palmyra, an ancient city, in a fruitful and well-watered oasis of the Syria desert. It was the Tadmor or Thadmor of the Hebrews (I Kings i x: 18, and II Chron. viii: 4), founded, or enlarged by Solomon, about 1001 B. C). Both its Greek name Palmyra, and its Hebrew name Tadmor, signify the city of palms, and the Arabs call it Tedmor. It submitted to the Emperor Hadrian in 130 (I Kings ix: 18, and II Chron. viii: 4), and rose to its highest power in the 3d century. Sapor I., King of Persia, was defeated here by Odenathus in 262. Odenathus was murdered about 267, and his wife Zenobia assumed the title of Queen of the East. Her army having been defeated at Antioch and at Emesa, Zenobia was besieged in her capital by the Emperor Aurelian in 272. She attempted to make her escape, but was taken prisoner, and Palmyra surrendered in 274. The citizens slew the Roman garrison, and Aurelian destroyed Palmyra. It was restored by Justinian I. in 527, and again destroyed by the Saracens in 744. It was plundered by Tamerlane in 1400. Its site was long unknown, till the spot was at last penetrated by some European travelers. It had an immense temple dedicated to the sun, of which 60 columns out of 300 still remain. Of its appearance in modern times Volney observes: "In the space covered by these ruins, we sometimes find a palace, of which nothing remains but the court and walls; sometimes a temple, whose peristyle is half thrown down; and now a portico, a gallery, a triumphal arch. If from this striking scene we cast our eyes upon the ground, another almost as varied presents itself. On which side soever we look, the earth is strewn with vast stones half buried, with broken entablatures, mutilated friezes, disfigured reliefs, effaced sculptures, violated tombs, and altars defiled by the dust."

Palmyra Wood, properly the wood of the Palmyra palm; but the name is used for all kinds of imported palm-tree wood; much of which is the wood of the cocoanut palm, *Cocos nucifera*, and the allied species *C. plumosa*.

Palni Hills, a range of Southern India, linking the S. extremities of the Eastern and Western Ghâts; average height of the higher ridge, 7,000 feet. The climate of the Palni Hills is singularly pleasant and

Palstave

equable, many preferring the sanatorium of Kodaikanal to Ootacamund.

Palo Alto, Cal. See LELAND STANFORD JR. UNIVERSITY.

Palo Alto, the name of a plain in Southern Texas, 8 miles from Brownsville, where the first battle of the Mexican War was fought, May 8, 1864. Gen. Zachary Taylor was in command of the United States troops of 2,300 men, while the Mexicans, under General Arista, had about 3,500. The battle was fought principally with artillery and the Mexicans were defeated.

Palolo (*Palolo viridis*), an edible annelid, allied to the lug worm, extremely abundant at certain seasons in the sea above and near the coral reefs which surround many of the Polynesian Islands. The body is cylindrical, slightly tapering at both ends, divided into nearly equal joints, each joint with a small tuft of gills on each side. In thickness the palolo resembles a very fine straw; in length it varies from 9 to 18 inches. These annelids make their appearance in great multitudes, apparently rising out of the coral reefs, and with a periodical regularity which is very remarkable. They are eagerly sought after by the islanders, who are on the watch for their appearance, and go out in canoes before sunrise to take them by means of nets; but they often occur in such numbers that the water seems to be full of them and they may be grasped by handfuls. After sunrise the creatures break into pieces and the shoals are not seen till the next period, which seems to have a definite relation to the lunar time; the two stated periods being in October and again in November.

Palpi, jointed processes, supposed to be organs of touch, attached in pairs to the labium and maxilla of insects and termed respectively labial and maxillary palpi or feelers. Palpi are developed also from the oral appendages of spiders and crustacea.

Palpitation, a sensible, abnormal beating of the heart, most frequent in adolescents, particularly females, and in advanced life, indicating want of power and laborious efforts rather than increased excitement and action. It is frequently associated with dyspepsia, and often with various morbid states of the heart itself. The action may be quite regular, but is usually intermittent.

Palstave, or **Paalstab**, in archæology, the generic name of a class of implements consisting of wedges, more or less ax-shaped, having a groove on each side, terminating in a stop-ridge, and with lateral flanges designed to secure a hold on the handle. The general characteristics of the palstave seem to indicate that it was a carpentering tool rather than a weapon of war.

Palsy

Palsy, the loss of the power of motion. It is a symptom of disease, usually of apoplexy. The two causes on which it depends are an affection of a nerve or nerves, or a morbid state of the nervous centers, the brain or spinal cord. Under the former head poisoning of nervous matter or any morbid process impairing the nerves or solution of continuity, or pressure may cause it; under the latter, it is due to a morbid state of the centers of the nervous system. The commonest form is hemiplegia, a paralytic stroke on one side or half, which may be complete, profound, or incomplete. The upper and lower extremities, the muscles of mastication, and, when complete, those of the face, on one side of the body, are all affected. Consciousness may not be lost, but the patient cannot stand. No voluntary movements can be performed; sometimes no reflex, involuntary muscular movements, or only those of the lower extremity, are performed, and only partially and painfully. In some cases the eye can be shut, but not opened (see PTOSIS), owing to paralysis of the third nerve. The brain lesion and the palsy are on opposite sides owing to the decussation of the pyramidal columns of the medulla oblongata. Brown-Séquard has found exceptions to this rule, also to the body and face being paralyzed on the same side. It is rare in the spinal cord, paraplegia or palsy of both extremities being the usual form of lesion there. There are six forms: Cerebral, spinal, epileptic, choreic, hysterical, and peripheral, their frequency being in the order named. Palsy is uncommon but serious in the young, and most common in advanced life. There are four modes of termination: (1) Death; (2) complete recovery with wasting muscles; (3) partial recovery with rigid muscles; (4) complete recovery. Recovery begins with the speech, tongue, and face, the lower limb next, and, if at all, a good while after, the use of the upper limb returns. In hysterical hemiplegia the lower limb, instead of being dragged by a rotary movement, is usually dragged straight forward.

Paltock, Robert, an English lawyer; born in London, England, apparently in 1699. He was educated at St. Paul's School, bred to the law, and while in Clement's Inn secured his title to remembrance by writing the wondrous tale of "Peter Wilkins, a Cornish Man," published anonymously in 1750, and often reprinted. The authorship, known to some in 1802, remained generally a mystery till 1835, and first appeared on the title page in 1839. Paltock died March 20, 1767.

Paludal Diseases, diseases arising from malaria in marshy places,

Pamirs

Paludan-Müller, Frederik, a Danish poet; born in Kjerteminde, Fünen, Feb. 7, 1809, led a quiet, uneventful life. While still a student at the university in Copenhagen, he gained the ear of the public with a play, "Love at Court" (1832); a poem, "The Dancer" (1833); and a lyric drama, "Amor and Psyche" (1834; 8th ed. 1883)—all three decidedly romantic in temper, the second especially showing Byronic influence. But his fame rests on "Adam Homo" (3 vols. 1841-1849; 7th ed. 1885), a humorous, didactic poem, full of deep suggestive thought, with no small share of satiric wit and irony, and strong realistic touches, and of the most finished literary workmanship; on "Kalanus" (1854), a contrast between Alexander the Great and the Indian sage Kalanus, as representatives of Greek culture and Hindu religion, a work written in the loftiest spirit of idealism and on "Adonis" (1874), an exquisitely finished little mythological poem. Along with "Kalanus" he published the poems "Paradise," "Abel's Death," "Cain," "Ahasuerus," and "Benedict of Nursia"; and he wrote also two prose romances, "The Source of Youth" (1865) and "Ivar Lykke's History" (3 vols. 1866-1873). His poetical works were published in eight volumes, in 1878-1879. He died in Copenhagen, Dec. 29, 1876.

Paludamentum, the characteristic dress of a Roman general in command of an army, and his staff; it was less cumbrous than the toga, and more ample and graceful than the sagum, or cloak, worn by the common soldiers. It was in color scarlet, purple, or white, open in front, reaching down to the knees, and fastened on the shoulder by a brooch.

Pamban Manche, the native name for a canoe used on the Malabar coast for conveying persons on the rivers and back waters. They are from 30 to 60 feet in length, not more than three feet in beam, and are hollowed out of a single tree. The largest are rowed by about 20 men, double-banked, and can attain a speed of 12 miles an hour. They are also called serpent boats, or snake boats.

Pamirs, The, ("roof of the world") the name given to that part of Central Asia where the frontiers of Russia, China, and Afghanistan adjoin. It forms the nucleus of the Central Asiatic highland system, uniting the Himalaya and the mountains of the Tian Shan range with the Hindu-kush, and is traversed by a number of mountain ridges interspersed with broad valleys, the average altitude of the intervening table lands being 13,000 feet, while several of the highest peaks exceed 25,000 feet above the sea. This region has from the earliest times attracted the interest of

Pamlico

geographers. It was traversed by Marco Polo and in recent years has been visited and described by a number of travelers, among whom Lord Dunmore, Lord Curzon, Col. T. E. Gordon, Mons. Bonvolet, Maj. C. S. Cumberland, Captain Younghusband and Sven Hedin, the Swedish explorer, are the best known. All these agree in their description of the vastness of the snow-capped mountains, the ruggedness of the intervening valleys, the sparseness of life to be met with and the intense severity of the climate of the region.

The term pamir implies a mountain valley of glacial formation. During the brief summer these valleys are strewn with patches of grass, which serve as pasturage for the herds of the nomadic Kirghiz who haunt the regions, while for the rest of the year the whole of the pamirs are covered with snow. The pamirs contain much game and provide a perfect paradise for the sportsman, provided he can endure the extremes of cold. The only population existing in the region are Kirghiz of the lowest type, and the territory has no value, except for the political importance of the position. In 1895 the Russo-Afghan border line across the pamirs was settled by a convention drawn up by an Anglo-Russian boundary commission. The Russian-Chinese frontier was not, however, affected by this convention, the only understanding existing being that entered into between Russia and China in 1894, by which Russia undertook never to interfere with that portion of the pamirs occupied by China. In 1899, however, the Russians manifested a desire to annex Sirikul, a province of the Kirghiz, and to break their treaty with China. Their trade through the pamirs is quite large and constantly growing.

Pamlico, a tribe of Indians living on the Pamlico river, in Beaufort co., N. C. They were greatly reduced in numbers by the smallpox in 1696, and by the Tuscarora War of 1711.

Pamlico Sound, a shallow lagoon of the United States, on the S. E. coast of North Carolina. It is 80 miles long, from 8 to 30 miles wide, and separated from the ocean by long, narrow, sandy islands.

Pampas, properly treeless pasture land covered with grass, but used more comprehensively for the whole table-land of South America, from the boundary of Brazil, where the regular seasons of the tropics cease, across the States of La Plata and Patagonia nearly to Cape Horn. It may be divided into three botanical zones: the Interior Northwestern Chinar-steppe, the True Pampas, and the Southern plains of Patagonia.

Pampas Grass (*Gynerium argenteum*), a grass which grows in the pampas in the

Pampas Grass

S. parts of South America. It has panicles of silvery flowers on stalks more than 10 feet high, and its leaves are from 6 to 8 feet long. The male and female flowers are on separate stalks.

Thirty years ago the pampas grass was a curiosity. Many New England homes had treasured specimens which were brought across the seas as souvenirs from the vast pampas lands of South America. Now the pampas plume has been introduced into America and in California forms one of the standard crops. The vast fields of grass in its light gray tints present a beautiful scene, rippling in the wind, the soft colors and graceful shapes being particularly pleasing to the eye, and when seen in long stretches, as on the Rancho del Fuerte near Whittier, a more attractive sight can hardly be imagined. Yet the full beauty of a pampas field in perfection is never or rarely seen in California, as the plumes are gathered before they are perfectly ripe and white.

Santa Barbara Co., Cal., is the region most famous for this grass, and here the first experiments were made with it, the roots having been brought, it is said, in the early sixties, from South America by a Spanish gentleman. It was soon seen that the pampas plume in the United States would be a profitable venture, and when it was found that the plants would live, roots were imported and many acres planted in various parts of California, resulting in the pampas ranches of today. One of these is found S. of Pasadena, over the Mission hills, owned by Mrs. Strong, the pioneer of plume raising on a large scale, the first to introduce the plumes as part of the regalia of political clubs. Their use by tens of thousands in the Blaine campaign gave significance and novelty to the ranks of the followers of the Plumed Knight, each of whom bore one of the attractive plumes.

The plumes have no special economic value aside from their use as ornaments. They are dyed all colors of the rainbow, jet black and silver, and bring a good financial return in the large cities and in the localities where they are not known. Thousands of plumes are thus employed all over this country and Europe, Germany especially being an important field for the plume. Of all the enterprises in California, this is one of the most æsthetic. The orange picking and packing is interesting to the average tourist, the great groves with their golden fruit being always a fascinating sight, but the pampas plume is so dainty that it appeals to the artistic.

The ranches or plume orchards are planted from roots often obtained direct from South America to renew the stock in its full vigor, but the roots are easily obtain-

Pampean Formation

able in California. These are planted a third farther apart than ordinary fruit trees, as the plants grow to enormous size. Like the tobacco, it is exhausting to the earth, sapping it of its moisture and richness, and taking so firm a hold upon the soil with its mass of roots that only dynamite will blow it out. The pampas plume farmer plants them in hills 10 by 16 feet apart, each hill representing five or six individual plants which appear to the casual observer to be one enormous bunch. The first year a few plumes will be seen; the second and third each hill may be counted on producing from 50 to 200, and the fourth and fifth and sixth years see a fine crop, the plant now being, if the conditions are perfectly favorable, 19 or 20 feet high and 12 or more across. The ground is kept weeded, and after the fifth year old stock is weeded out, the best results coming from plants between four and five years of age. In the high lands, where the plants are exposed to the warm rays of the sun and evaporation is rapid, the plants are irrigated once a month.

In September the picking of this unique crop begins about the time of the vintage, and on the large pampas plume ranches troops of Mexican or white laborers can be seen trimming the grass. As soon as the tips of the grass begin to appear, they are cut and carried to the tables where women pull off the sheaves, skilled hands making \$1.50 per day at the work. Children now take the plumes and lay them in long rows in the sun to dry and bleach. When the industry was in its incipency, it was doubtful if it could be made a success, as the plumules dropped off and it was impossible to transport the plumes, but someone discovered that if the plume was picked when it was not quite ripe it would hold together, which solved the entire problem.

In sunny localities a day or so suffices to dry the plumes, and at such times the ground appears, from the hills, to be covered with snow. After the drying the plumes are taken to the curing house and then finally sorted into various grades by expert hands. The finest and most beautiful plumes are about 36 inches long, and they are packed for shipment either in packages of 2,000 or in large cases, the prices ranging from \$200 to \$50 per thousand, according to the demand.

There are numerous pampas orchards in California ranging in their productive quality from 5,000 hills, which produce 250,000 plumes, down to small ranches where but a few are raised. In all, California produces about 2,500,000 plumes per annum, which are sent all over this country and Europe. CHARLES F. HOLDER.

Pampean Formation, a formation deposited and upheaved since the present At-

Pamunkey

lantic mollusca have been brought into existence. Darwin found in this formation remains of the extinct genera *Megatherium*, *Megalonyx*, *Myodon*, *Glyptodon*, *Toxodon*, *Macrauchenia*, etc. Such a relationship seemed to him to exist between the extinct fauna and that now inhabiting the region, that he inferred the one had descended from the other.

Pampeluna, or **Pamplona**, a fortified city of Spain; on a tributary of the Ebro; 111 miles N. W. of Saragossa. It has a citadel (a copy of that of Antwerp), a Gothic cathedral (1397), a viceregal palace, a fine aqueduct, a natural history collection, a college of surgery, and a bull ring, manufactures of pottery, leather, cloth, hardware, etc., and a trade in wine. It was called by the ancients Pompeiopolis, because built by Pompey in 68 B. C. It was taken by the Goths in 466, by the Franks in 542, and by Charlemagne in 778. From 907 it was the capital of Navarre. It was during the siege by the French in 1521 that Loyola received his wound. The town was seized by the French in 1808, and held by them till 1813, when it was captured by Wellington. It again capitulated to the French in 1823. In the Carlist wars it was held by Queen Christina's adherents from 1836 to 1840, and in 1873-1876 it was vainly attacked several times by the Carlists. Pop. about 26,000.

Pamphilus, a Christian martyr of Syria; born probably in Berytus. He was a presbyter of Cæsarea and for refusing to sacrifice to idols was cast into prison. Eusebius visited him during his imprisonment and collaborated with him in writing "The Apology for Origen." Persisting in Christian loyalty, Pamphilus was martyred Feb. 16, 309.

Pamphlet, a small book or treatise consisting of a few sheets of paper stitched together; a short essay or treatise, generally on some subject of merely temporary interest or minor importance. Pamphlets seem to have been first published in England in the 16th century during the Reformation controversy.

Pamphylia, anciently a country on the S. coast of Asia Minor, with Cilicia on the E. and Lycia on the W. It was originally bounded on the inland or N. side by Mount Taurus, but afterward enlarged, so as to reach the confines of Phrygia. Pamphylia is mountainous, was formerly well wooded, and had numerous maritime cities. The inhabitants — a mixed race of aborigines, Cilicians, and Greek colonists — spoke a language the basis of which probably was Greek, but which was disfigured and corrupted by the infusion of barbaric elements.

Pamplona. See PAMPELUNA.

Pamunkey, a small river in Virginia formed by the union of the North and

Pan

South Anna. It unites with the Mattapony at West Point to form the York river. In conjunction with the South Anna it is over 100 miles in length.

Pan, in Greek mythology, the god of shepherds, of huntsmen, and of all rural inhabitants. He was the son of Mercury, and was a monster in appearance, having two small horns in his head, a ruddy complexion, a flat nose; and his legs, thighs, tail, and feet were like those of a goat. His education was intrusted to a nymph of Arcadia, but she was so terrified at the sight of the monster, that she fled from him. His father then wrapped him in the skins of beasts, and carried him to heaven, where Jupiter and the gods long entertained themselves with the oddity of his appearance, and Bacchus gave him the name of Pan. He quitted the abode of the gods, and dwelt chiefly in Arcadia, choosing for his habitation the most sequestered woods and rugged mountains.

Panama, a republic of Central America, formerly the Department of Panama, in the Republic of Colombia; seceded, and after a short revolution proclaimed its independence on Nov. 3, 1903; area, 31,571 square miles; pop. (1903) about 300,000. After the Colombian Senate had failed to ratify the treaty with the United States, providing for the construction of an isthmian canal on the Panama route, the people of Panama determined to renounce all allegiance to Colombia, to form an independent government, and to undertake direct canal negotiations with the United States. The new republic chose for its special minister to the United States M. Bunau-Varilla, of France, who was familiar with the entire Panama canal scheme, and also sent Dr. Manuel Amador, its Minister of Finance, and Federico Boyd, a member of the Panama Junta, as special commissioners to Washington to negotiate with the United States a canal and other necessary treaties. The United States government recognized Panama as a *de facto* government on Nov. 6. On the 13th, President Roosevelt received M. Bunau-Varilla as Minister of Panama, and on Dec. 12, he nominated William J. Buchanan to be Minister to Panama. In the meantime the new republic arranged to assume all the obligations of Colombia under the canal treaty with the United States, and on Nov. 18, Minister Bunau-Varilla and Secretary Hay signed a treaty providing for the construction of the Panama canal by the United States, granting to the latter in perpetuity the necessary right of way, and also conceding to it full sovereignty and jurisdiction thereon. This treaty was ratified by the Panama Junta on Dec. 2, and at the time of writing was under discussion in the United States Senate. On Dec. 28, Minister Bunau-Varilla notified the British ambassador at Washington that Panama would

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assume a proportionate part of the foreign debt of Colombia as soon as its independence was recognized by Colombia. While these events were in progress General Reyes, of Colombia, went to Washington and made unavailing attempts to have the United States recede from its position in regard to Panama, and the United States sent warships to both coasts of Panama and landed marines to protect the integrity of the new republic. By the end of January, 1904, the independence of Panama had been recognized by all the Great Powers.

Panama, Isthmus of, formerly called the Isthmus of Darien, has a breadth of from 30 to 70 miles, connects North with South America, and separates the Pacific from the Atlantic.

Panama Canal. As early as the year 1528 the idea of a ship canal across the isthmus was entertained, but dropped for political reasons, Philip II. ordering that it should not be renewed on pain of death. In 1826 a line for such a canal was traced between Panama and Portobello; and between 1843 and 1874 repeated surveys were made by French, English, and American engineers with the same view. A congress was held in 1879 in Paris to take into consideration the feasibility of the often suggested scheme, on which occasion several projects were submitted by M. Henry Birome, secretary of the French section. The first route is, next to the Nicaraguan scheme, the longest. It crosses the State of Cauca, in the United States of Colombia, on a line measuring 193½ miles. It leaves the Atlantic at the Gulf of Uraba, ascends the Atrato river, thence crosses to the Napipi river, and descends through the Doguado into the Pacific at a point called Chiri-Chiri. This route was surveyed by American officers and engineers: Selfridge, Lull, Schultz, Sullivan, Conden, Collins, and others, 1871-1872, and Collins, Eaton, Sullivan, and Paine, 1875. The cost was estimated at \$99,000,000, and it was believed that the work could be finished in nine years. The second route starts from the same point on the Atlantic, but is much shorter. It leaves the Gulf of Uraba or Darien, ascends the river Atrato, thence by the rivers and lakes Caquirri, Puquia, Cué, Paya, and Tiryra into the Gulf of San Miguel; 128 miles of canal would have to be dug. The advantages are splendid ports at both ends, and the ease with which the excavations can be made, owing to the nature of the soil. A serious objection is found in the fact of the difficulties inherent in the use of two systems of water supply. This route was carefully surveyed by Wyse, Reclus, Cellar, and others in 1876-1878. The estimated cost was \$130,000,000, and it would require 12 years' labor. The third scheme, closely allied to the two preceding, starts from the Atlantic

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coast of Acanti, and terminates in the Gulf of San Miguel. Its total length is only 84 miles. The chief obstacle is found in the tunnel. It traverses a region of great salubrity of climate. This route was examined by the International Commission, composed of Messrs. Wyse, Reclus, Sosa, Lacharme, Verbrugghe, and others, 1876-1888. Its cost was estimated at \$20,000,000, and the length of time required to complete fixed at 12 years. The fourth scheme is what is called the "Darién route." The great claim of this route is the shortness of the line. The fifth and sixth of these routes cross the two departments of Colon and Panama, in the State of Panama. They leave the Atlantic at Navy Bay and terminate in the Gulf of Panama. The two projects are so nearly alike that they can be treated as one, the only difference being at the Pacific side, where a slight change in direction adds 1 mile to the total length. For all practical purposes these routes follow the Panama railroad. The fifth project contemplates a canal 48 miles in length. Twenty-five locks would have to be constructed. It was examined by Garella in 1843, Totten in 1852, and the American commission under Lull in 1875. The cost of the lock route was placed at \$96,000,000, and could be completed in six years. The sixth project contemplated a canal 48½ miles long, 47,000,000 cubic meters of excavations, and, in place of the locks, a tunnel 4 miles in length. The tunnel was the new feature added by the International Commission of 1879. Its cost would be about the same, and it would require an equal length of time.

This route was the one selected by the distinguished French engineer M. de Lesseps, who constructed the Suez Canal. His original plans contemplated a "sea-level" cutting without locks. Early in 1880 he was upon the ground with his scientific corps, and work was continued till 1889, when the lack of funds compelled a stoppage. The report of the special commission sent out by M. Brunet, the liquidator of the Panama Canal Company, to investigate the condition of the canal, estimates that it would cost \$97,000,000 to complete the canal on the lock system. To this should be added 20 per cent. for unforeseen expenses and 29 per cent. for the expenses of management and for interest. The total cost was fixed at \$180,000,000. The report further said that it would take between seven and eight years to complete the canal. The annual cost of management was estimated at \$2,000,000. In 1897 the United States government appointed a commission, Rear-Admiral John S. Walker, president to examine and report on the most practicable route for a canal across the isthmus.

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On Dec. 4, 1900, the commission reported unfavorably to the Panama route. On Jan. 4, 1902, the new Panama Company offered to sell its entire rights to the United States for \$40,000,000. The prohibitive price originally asked, over \$100,000,000, had been one of the deciding factors in the commission's report favoring the Nicaragua route, and the new offer consequently again opened the whole matter for discussion. If the offer were accepted the complete estimated cost of the Panama canal would be \$184,233,358, about \$5,000,000 less than the estimate for the Nicaragua route. The physical features of the Panama route as then viewed were: Length, 49 miles; time of transit, 14 hours. The construction of a canal with locks had been pronounced practicable by an international board of French, English, German, Russian, and American engineers. The new plans provided for the usual system of locks and dams. Much was made of the fact that good harbors exist at the Atlantic and Pacific terminals, and that the canal was practically finished from Colon to Bujeo, 14 miles. The width of the canal, according to the calculations made at that time, was to be 160 feet at the top and 72 feet at the bottom, except through the Culebra ridge, where it was to be reduced to 78 feet at the top and 29 feet at the bottom.

The Senate on June 19, 1902, passed the Panama Canal bill by a vote of 67 in favor to 6 against. The radical change in sentiment as here illustrated, in comparison with the Hepburn Nicaragua House bill, may be largely accounted for by the masterly way in which the Canal Commission placed the result of its investigations before Congress, sufficient to convince many men of a practical turn of mind of the several advantages of the Panama route. In addition to this the terrible disaster at St. Pierre, Martinique, caused by the tremendous volcanic eruption of Mont Pelée, fixed in the minds of many the futility of constructing a canal in a region having a record for volcanic disturbances and earthquakes. Thus when the merits of the Panama Canal became fully known and the possibility of its acquirement for a reasonable sum and the probability of securing the desired right of way on equitable terms, there was an irresistible sentiment created in its favor which was reflected in the nearly unanimous vote of the Senate. In the debate preceding the vote the shortness of the Panama Canal as compared with the Nicaragua was emphasized as one of the most important points of its advantage—49 miles, as against 183. The depth is to be 35 feet. The principal provisions of the Senate bill are:

(1) That the President is to acquire for the United States, at a cost not exceed-

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ing \$40,000,000, all of the rights, privileges, franchises, concessions, grants of land, rights of way, unfinished work, plants, and other property owned by the New Panama Canal Company of France on the Isthmus of Panama and all its maps, plans, drawings, records on the Isthmus of Panama and in Paris, including all the capital stock, not less, however, than 68,862 shares of the Panama Railroad Company, owned by or held for the use of said canal company, provided a satisfactory title to all of said property can be obtained.

(2) That the President is to acquire from the republic of Colombia exclusive and perpetual control of a strip of land not less than six miles wide from the Caribbean Sea to the Pacific Ocean, and the right to use and dispose of the waters thereon, and to excavate, construct, and perpetually to maintain, operate, and protect thereon a canal of such depth and capacity as will afford convenient passage of ships of the greatest tonnage and draught now in use, from the sea to the ocean; this control to include the right perpetually to maintain and operate the Panama railroad, if the ownership thereof, or a controlling interest therein, shall have been acquired by the United States; also jurisdiction over the strip and the ports at the ends thereof, to make the necessary police and sanitary rules and regulations, and to establish judicial tribunals to enforce the same. The President also may acquire such additional territory and rights from Colombia if deemed necessary.

(3) Forty million dollars is appropriated to pay for the property of the New Panama Canal Company and a sufficient amount to pay Colombia for the territory acquired from that country for building the canal. The President is then, through the Isthmian Canal Commission, authorized by the act to proceed with the construction of the canal, utilizing as far as practicable the work already done. The canal is to be supplied with all necessary locks and other appliances. Provision is made for the construction of safe and commodious harbors at the termini of the canal, and for such works of defense as may be necessary for the safety and protection of the canal and harbors.

(4) In the event that the President is unable to secure a satisfactory title to the property of the New Panama Canal Company and the control of the necessary territory from Colombia, and after first having obtained for the United States exclusive and perpetual control by treaty of the necessary territory from Costa Rica and Nicaragua, he is then to have authority to begin the construction of the canal over the Nicaragua route on the same general conditions as apply to the Panama Canal. An appropriation is provided for compensation, through a treaty, to Costa Rica and

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Nicaragua for rights and concessions they are to grant.

(5) An appropriation of \$10,000,000 is made to begin the project, and by a further provision all appropriations are not to exceed in the aggregate the additional sum of \$135,000,000 if the Panama route be adopted, or \$180,000,000 should the Nicaragua route be selected.

(6) In any agreement made with Colombia, Nicaragua or Costa Rica the President is authorized to guarantee them the use of the canal and harbors, upon such terms as may be arranged, for all vessels owned by those countries or by their citizens.

(7) An Isthmian Canal Commission of seven members is created, to be nominated by the President and confirmed by the Senate. They are to have charge of construction of the canal and are to be subject to the direction and control of the Executive. Four of the seven are to be skilled in the science of engineering, one is to be an officer of the army, and one other an officer of the navy. Authority is given for the employment of engineers from the army and civil life and other necessary persons. The commission is to make reports to the President and to give Congress such information as may be required.

(8) Outside of the \$10,000,000 appropriated, authority is given for the issue of \$130,000,000 2 per cent. 20-year gold bonds exempt from taxation in denominations of \$20, or a multiple of that sum, to be sold at par and open to popular subscription, the proceeds to be used on the construction work as required.

The passing of the Senate bill without amendment on June 26 by the House of Representatives by a vote of 252 in favor to 8 against was regarded as a memorable act of legislation calculated to promote the growing commercial supremacy of the United States, for it seemed to insure the construction of an inter-oceanic canal, which, when finished, would be used by the entire commercial world. Quickly following the passage of the bill the President completed the law by affixing his signature on June 28. A treaty was negotiated between the United States and Colombia under this law. It was promptly ratified by the United States Senate, but was unanimously rejected by the Colombian Senate, Aug. 12, 1903. In October following Colombia proposed a new canal treaty in consideration of the payment of \$25,000,000 by the United States for the advantages it would receive and an agreement to let the territory remain a part of Colombia. This proposition met no favor in the United States. While Colombia was still pressing it, on Nov. 3, 1903, in the city of Panama a revolution broke out which spread rapidly through the department of Panama and speedily ended there the sov-

ereignty of Colombia. Almost at once the new Panama government proposed to conclude an isthmian canal treaty with the United States. On Nov. 18, 1903, a treaty was signed in Washington, on Dec. 2 was ratified by the Panama government, and on Feb. 23, 1904, was ratified by the United States Senate. On Feb. 29 a new Isthmian Canal Commission was appointed, and on April 22 papers were signed at Paris, transferring to the United States the Panama canal zone, 10 miles in width, for the sum of \$40,000,000. This property was formally turned over to the commissioners on May 4.

Opinion being strongly divided about the type of canal that should be constructed, President Roosevelt created in September, 1905, a Board of Consulting Engineers, consisting of eight American members and five European, to consider and recommend the best plan for the interoceanic waterway. After visiting the isthmus these eminent engineers returned to Washington and reported in January, 1906. Their votes were eight to five in favor of a sea-level canal, all the five foreign members being included in the majority. The Isthmian Canal Commission, however, recommended the minority's plan of a lock canal to the secretary of war, who in turn approved it; and President Roosevelt supported this view in his report to Congress. Final approval of the lock canal project was given on June 21, 1906, by the Senate, the vote being 35 to 31. The route of the Panama ship canal finally decided upon is almost identical with that planned by former projectors, and is practically the same as that of the Panama railroad. From the seven-fathom curve in Limon bay, a mile northwest of Colon, on the Atlantic side, to the seven-fathom curve of Panama bay, on the Pacific side, the total length of the canal will be 49.72 miles. A good general idea of its plan may be had by a glance at an authorized detailed description by the Isthmian Canal Commission:

"The general type of canal proposed is to form a summit level about 85 feet above the sea, which is to be reached by a flight of locks located at Gatun on the Atlantic side, and by one lock at Pedro Miguel, with two others at La Boca, on the Pacific side; the locks all to be in duplicate. The summit level will be formed by the construction of a large dam at Gatun, and a small one at Pedro Miguel. A second lake, with a surface elevation of 55 feet, will be formed on the Pacific side between Pedro Miguel and Panama bay by the construction of a dam at La Boca, across the mouth of the Rio Grande, and another dam between Sosa Hill and high ground near Corozal.

"The first, or Colon section, is from the Caribbean Sea to the mouth of the Mindi river, where a channel is to be excavated,

having a bottom width of 500 feet and a depth of 42 feet below mean tide.

"From the mouth of the Mindi river to the Gatun locks the canal is to have a bottom width of 500 feet and a depth of 42 feet below mean tide.

"The Gatun locks are to be built in duplicate—that is, there are to be two sets of locks, side by side. The lift will be overcome by a flight of three locks of $28\frac{1}{3}$ feet ordinary lift each, or a flight of two locks of $42\frac{1}{2}$ feet lift each. . . . At the upper end of the upper lock and the lower end of the lower lock guide walls will be constructed for the handling of vessels entering or departing.

"The location of the Gatun dam is near the Gatun Hills, in which the locks are located, to the hill about 3,500 feet westward, in which the spillway will be located, and extends from thence in a broken line to the high ground westward. In the construction of this dam, all trees, stumps, and roots from the site are to be removed and the surface excavated to such depth that the impervious material of which the dam will be composed will come into direct contact with that on which it is to rest.

"The object of this dam is to form a reservoir in which the floods of the Chagres will be received. Its area will be about 110 square miles." The dam is to have a height of about 135 feet above sea level. The width on top is to be 100 feet. The slopes above lake level are 1 on 2, and below this 1 on 3 on the lake side and 1 on 25 on the opposite side. Its length will be about 7,700 feet, and the width at bottom about 2,625 feet.

"Works for regulating the level of the lake will be located in the hill which lies about midway between the two extremities of the dam. These consist of a system of Stoney gates constructed on foundations of concrete. The gates proposed are almost exact counterparts of those built for controlling the flow of water in the lower end of the Chicago Drainage canal.

"From the Gatun locks to San Pablo, a distance of about $15\frac{1}{2}$ miles, the width of the channel will be at least 1,000 feet, and all growth within 50 feet of water surface of lake for that width must be destroyed or removed. The depth is to be 45 feet. Farther up the lake the width of the channel will be decreased, first, to 800 feet for a distance of 3.86 miles, from near San Pablo to Juan Grande; then to 500 feet from Juan Grande to Obispo, a distance of 3.73 miles; then to 300 feet from Obispo to Las Cascadas, a distance of 1.55 miles, where will begin the Culebra cut.

"From Las Cascadas to near Paraiso, known as the 'Culebra cut' section [see accompanying illustrations], a distance of 4.7 miles, the width of the canal will be 200 feet. This is the heaviest portion of the work.

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"From near Paraiso, the end of the Culebra cut, to the Pedro Miguel lock, a distance of 1.88 miles, the canal will have a width of 300 feet.

"The Pedro Miguel lock will have a lift of 30 feet. It will be in duplicate, and will have approach walls constructed at each end. . . . A short dam from the lock to the hill to the northward will be constructed to retain the water in the summit level.

"From Pedro Miguel lock the channel will have a width of 500 feet for a distance of 1.87 miles. It will then increase to 1,000 feet or more for a distance of 3.61 miles to near Sosa Hill, on the shore of Panama bay, where the Sosa locks will be located.

"The Sosa locks are to be in a flight of two with a lift of $27\frac{1}{2}$ feet each, and to be in duplicate. . . .

"A dam will be constructed across the Rio Grande from San Juan Hill to Sosa Hill, another from Sosa Hill to Corozal Hill, and a small dam from Corozal Hill to the high ground to the eastward. These dams will form a lake known as Sosa Lake. It has an area of about eight square miles, and will be provided with regulating works for discharging its surplus waters.

"From Sosa locks to the deep water in Panama bay, a distance of about four miles, the channel is to have a bottom width of 500 feet and a depth of 50 feet below mean tide. The mean rise and fall of the tide is about 15 feet, but it may reach as much as 22 or 23 feet.

"The Panama railroad will be relocated throughout almost the entire distance from the mouth of the Mindi river to Panama. Some heavy embankments will be required to cross certain portions of Gatun Lake."

A few alterations of the above plan were necessary after the work was under way. The canal is being built by contract, as this was considered the most economical and quickest method of accomplishing the work, which was so subdivided that each contractor might bid on as many sections as he desired to undertake. As Jamaican and other West Indian negroes were unable to stand the strain, and were not to be depended upon, Chinese coolies were brought to Panama in 1907 for the excavation work.

The total excavation up to Sept. 1, 1910, was 113,450,348 cubic yards; the amount then remaining to be excavated was 61,216,246 cubic yards; the total cost (including \$50,000,000 paid for French rights) was then estimated at \$375,000,000; and the canal was expected to be completed by Dec. 1, 1913, and dedicated Jan. 1, 1915. In August, 1910, a stretch $5\frac{1}{2}$ miles long, at the Atlantic entrance, was opened to navigation for the sand and rock fleet.

Panama Congress, a congress of delegates representing several American nations that met at Panama, June 22, 1826, to deliberate matters concerning their political

Panama Hats

interests. In 1823 Simon Bolivar (*q. v.*), president of Colombia, endeavored to promote a movement for forming an American confederacy by inviting Mexico, Buenos Ayres, Peru, and Chile to send representatives to Panama in furtherance of that project. The proposal, as then made, was not acceptable to all the governments invited; but in 1824 a similar invitation to all the Spanish-American republics was accepted without delay by Mexico, Guatemala, Peru, and Chile, and in November, 1825, the ministers of Mexico, Colombia, and Guatemala at Washington formally invited the United States to participate in the congress. President John Quincy Adams, urged by Henry Clay, then secretary of state, accepted the invitation, and after a debate in Congress, developing much opposition, largely due to fear of dangerous complications, the President's nominations of two delegates, Richard C. Anderson and John Sergeant, were confirmed by the Senate, and the House voted the necessary appropriation. Anderson died on the way to Panama, and when Sergeant arrived there the congress had adjourned. The governments represented in the congress were those of Colombia, Central America, Peru, and Mexico. The ten sessions held resulted in little more than a treaty of perpetual union for defense against Spain, and this was ratified by Colombia alone. The congress adjourned to meet at Tacubaya, Mexico, in the following year, but the meeting was never held.

Panama Hats, very fine plaited hats made from the fan-shaped leaves of *Carludovica palmata*, a dwarf palm tree which grows in Peru, Ecuador, Colombia, and Venezuela, and is called *Jipijapa* in Central America. The best are made at Moyobamba, a town of Northern Peru, and at Monari in Ecuador; they fetch a high price. The hats sold in New York, generally the poorest of all, come, for the most part, from the United States of Colombia.

The plant from which is obtained the material of which Panama hats are made is commonly called the Panama hat palm, though botanists do not group it under the head of palms, classifying it under the name *Cyclanthaceæ*. The botanical name of the particular species with which we are concerned is *Carludovica palmata*. The South American natives call it Palma de Pina. It is indigenous to parts of Ecuador, Colombia, Peru, Brazil and Central America. The word Jipijapa is the name of an interior town in Ecuador, and the natives in that part of the country commonly speak of the Panama hat as the Jipijapa hat. Another word that has been frequently used is Manabi. This is the name of a province in Ecuador, and Manabi hat is also synonymous with Panama hat. In Manabi province is the city of Monte Cristi, from which some exceedingly fine hats come. The ex-

pression *paja toquilla* has been erroneously used as the name of the plant, but it is the name of the straw obtained from it, since the word *paja* means straw. This straw is made from the flat leaf, and not from the stalk of the plant, though a casual glance at the exterior surface of a Panama hat would give the impression that it was woven from a fiber of cylindrical form. However, close scrutiny of the inner surface of the hat will disclose the fact that the fiber is not a cylinder. The method of preparing the straw is as follows: Young plants, not over four or five feet in height, are used for this purpose. Only the leaves that are young, stiff and in prime condition can be used. These are split into narrow strips by the native, who for this purpose uses his finger nails. But the strips are not separated at the stalk end. These bunches are then bleached in the sun. Up to this point you still have the flat straw; but what we shall call the rounding, for want of a better name, is accomplished by the deft-fingered native, aided by the natural tendency of the strip to curl. The strip is rolled from each of its two edges toward its middle, and thus is formed, ready for plaiting into a hat body, that excellent straw with no raw edges and which is deceptively like a cylinder. The French Panamas are made of this same material which is exported to Nancy, Saar Union and other places in Europe, where the French Panama hats are made. The statements that Panama hats are woven under water, or that the very fine ones are woven only by candle-light, are characterized as incorrect by a man who has all his life been engaged as a first hand in the Panama hat trade, and who has not only seen the hats made, but has made Panama hats himself. It is true that the hats are woven in the early morning hours when the atmosphere is damp, as the heat of the sun makes the fiber brittle and unfit for manipulation. At night the hat is hung out in the open air, where it absorbs the dew, and is the next day again in condition to be worked. This accounts for the great length of time required in the hat making, one of the very fine grades requiring upward of three and a half months to produce. The hat is woven on a block which is held between the knees of the operator, though some of the very coarse hats are woven on the knee of the native too poor to own a hat block. Men, women and children among the native Indians are engaged in the weaving of the hats. To the children is intrusted only the making of the coarser grades, and the youngsters become more skillful from year to year. Those who have long been engaged in the handling of Panama hats know from a glance at the button from what locality the hat comes. The button

is the little central portion of the crown of the hat, at which point the weaving begins and extends outward toward the edge. While a great deal has been written about \$100 and \$250 hats, it must be remembered that these are few in number. When one takes into consideration that a broken straw or a straw not matching in color the rest of the hat, or a knot showing makes the hat defective, it will be realized that there cannot be many of these extremely fine hats produced. The finishing of the hat is an operation requiring much skill, because each of the overlapping fibers has to be nicely turned back into the edge of the crown and trimmed off.

Most people in the trade are aware that the Panama hats are not made in Panama. The great majority of those from Peru and Ecuador find their way to Guayaquil, whence they are shipped to Panama, and, crossing the isthmus, are shipped from Colon. This is not true of the hats made in Colombia, many of which are shipped from Cartagena or Savanilla. The great market and distributing point for Panama hats is Havana, and it is an interesting and curious fact that most of the Panama hats sold in New York go from South America to Havana, via the United States in transit. This is because of the fact that the steamers do not deviate from their regular routes. Recently, however, some shipments of hats have been landed in the United States without going to Havana and then back again.

Pan-American Congress. Though the Panama Congress (*q. v.*) of 1826 was almost barren of results, the hope of American nations for a mode of union to further their common interests was not abandoned. Several subsequent attempts to establish such a union effected little more than did the first, but the object was thereby kept in view, and a gradual approach was made toward some better solution of the problems involved. It was not till 1889-90 that the aim began to receive promise of substantial success. On Oct. 2, 1889, a congress, over which James G. Blaine presided, met in Washington, every American republic except Santo Domingo being represented. Among many recommendations adopted were those relating to a common silver coin, a uniform system of weights and measures, an international banking system, uniform extradition treaties, reciprocity, uniform sanitary regulations, etc. The most practical result was the establishment of the Bureau of American Republics for the promotion of trade relations. A second congress met in the city of Mexico, Oct. 22, 1901, at the suggestion of the United States. The main subjects under consideration were an arbitration treaty, an international court of claims, and the reorganization of the Bureau of American Republics. During sessions last-

ing three months little was accomplished, Chile holding out against certain arbitration propositions. It was voted that another congress should be convened in 1906, and the third congress was held that year at Rio de Janeiro, its sessions beginning July 23 and ending Aug. 27, under the presidency of Joaquim Nabuco, Brazilian ambassador to the United States. Much interest was created by a speech of Elihu Root, secretary of state in President Roosevelt's cabinet. Though not a delegate, he was eagerly heard as he announced the friendly and disinterested policy of the United States toward the Central and South American republics. Among the matters agreed upon by the congress was the adoption of the Drago Doctrine, formulated by Louis Drago, an Argentine diplomat. It is a declaration that no nation has a right to undertake by force to collect debts due its citizens by another nation. It was agreed to refer this proposition, as well as a scheme of general arbitration, to the Hague tribunal. An appropriation of \$200,000 was made for the erection at Washington of a building for the Bureau of American Republics, and plans were adopted for increasing its usefulness. Progress was made with reference to a pan-American railroad, and agreements calculated to benefit the republics in many important ways were signed by all the delegates.

Pan-American Exposition, a fair held in Buffalo, N. Y., from May 1 till Nov. 3, 1901. It was distinctively an American exposition, the exhibits from the various States of the Union and of South and Central America being unusually full. The planning of the grounds and buildings was done with the greatest skill, and the total effect was simple and impressive. The buildings were made of staff, as were those of the Columbian Exposition, but were tinted a soft greenish-blue, thus avoiding the glare of the pure white. Power for the electrical exhibit, the finest ever given, was derived from Niagara Falls. Over 5,000 horse power and 200,000 incandescent lamps were used. The electrical tower alone had 44,000 electric lights on its sides. "The Midway," a section of the grounds devoted to various kinds of shows and entertainments, was very popular. It included a Japanese village, an Indian Congress, panoramas, etc. Financially the exposition was a failure, due largely to the setback that it received in connection with President McKinley's assassination, which caused a temporary closing. The total cost of the exposition was \$8,860,757.20; the total receipts, \$5,478,589.37.

Panard (pan-är'), **François**, a French lyric poet; born in Courville, near Chartres, about 1694. He wrote a series of admirable songs, besides vaudevilles and comic operas.

A collection of his more important work, "(Euvres Choies de Panard," was published in 1803. He died in Paris, June 13, 1765.

Panathenæa, the most famous festival of Attica, celebrated at Athens in honor of Athena, patron goddess of the city. All writers who mention it speak of a Lesser and Greater Panathenæa, the former held annually, the latter every fourth year. The procession of the festival was sculptured by Phidias and his disciples on the frieze of the Parthenon.

Panay, one of the Philippine Islands, belonging to the Visayan group, situated between lat. 11° 55' and 10° 24' N., and long. 121° 49' and 123° 9' E. from Greenwich. Its outline is nearly that of an isosceles triangle, the three sides extending from W. N. W. to E. S. E., from N. E. to S. W., and from N. W. to S. S. W. The island comprises the provinces of Antique, Capiz, and Iloilo; area, 4,611 square miles. A mountain range traverses it from the northwest corner to the southwest, not far from the coast, reaching an extreme elevation of 7,264 feet. A spur from the central part of this range extends to the northeast corner of the island. There are several rivers, navigable for vessels of slight draught only, but with many fertile valleys. Of the total area of 1,194,249 hectares [hectare = 2.471 acres], in 1903, 294,487 hectares were agricultural; of this, 184,247 hectares (including 38,830 of forest) were uncultivated. The leading crops are sugar cane, tobacco, paddy (unhulled rice), and hemp. Copra (dried cocoanut meat) and tuba (oil of the nipa palm) are also important products. Among the fruits are bananas, pineapples, and mangoes. The north coast is much broken, as is the east coast in its northern part. The best harbor is that of Iloilo, on the east coast. Pop. (1903) 743,646.

Panchatantra, a collection of Sanskrit beast-fables. Intermingled with the narrative are poems, dramas, maxims, etc. Several abridgments were made of it, of which the most important is the Hitopadesa (q. v.). It has undergone numerous modifications. An English translation by Tawney was published at Calcutta in 1880. See also BIDPAI.

Panchayat, a native Indian assemblage, properly of five persons, meeting as a court of arbitration, as a jury, or as a committee of the inhabitants of a village, etc., to decide questions interesting to the body generally.

Pancras, St., the son of a heathen noble of Synnada in Phrygia, lost both parents while a boy, and was taken to Rome by an uncle, and there baptized, but immediately afterward was slain (304) in the Diocletian persecution, being only 14 years old. The

Pancreas

first church that St. Augustine consecrated in England was dedicated to St. Pancras; it stood at Canterbury. The London terminus of the Midland railway, St. Pancras Station, is situated in the parish of St. Pancras.

Pancreas, in anatomy, an organ situated within the curve formed by the duodenum; its main duct opening into the intestine there, and secreting the pancreatic fluid, which resembles saliva, the gland itself resembling the salivary glands. Its function it to secrete this fluid which has a strong digestive action on starchy matter, and in a less degree on fatty matters and albuminoid substances.

Pancsova, a town in the S. of Hungary, inhabited by Servians and Germans; 9 miles N. E. of Belgrade, on the Temes, not far from its junction with the Danube. The people breed silkworms, brew beer, distil brandy, make starch, grind flour, etc. The Austrians took the place from the Turks in 1716, routed them there in 1739, burned the town in 1788, and in 1849 defeated the Hungarians under Kiss.

Panda, in zoölogy, *ailurus fulgens*, the wah, or red bear-cat, from the Eastern Himalayas and Tibet. Rich red chestnut on upper, black on lower surface and limbs; snout and inside of ears white; tail, bushy, reddish-brown, and indistinctly ringed. Total length about 30 inches. Its progression is plantigrade, and the claws are semi-retractile. In habits and in its main anatomical characters it is decidedly ursine.

Pandanaceæ, in botany, screw pines; an order of endogens, alliance Arales. It consists of trees or bushes, sometimes sending down aërial roots, sometimes weak and decumbent. Leaves imbricated, in three rows, long, linear, amplexicaul, generally with spiny margins, floral leaves smaller and often spathaceous. Flowers unisexual or polygamous; naked, or with a few scales, arranged on a wholly covered spadix. Stamens many, anthers two to four-celled, ovaries generally collected in parcels.

Pandarus, a son of Lycaon, remarkable for having broken the truce which had been agreed on between the Greeks and Trojans; he also wounded Menelaus and Diomedes; but was at last killed by Diomedes. Æneas then carried him off in his chariot, and, attempting to revenge his death, nearly perished by the hand of the furious enemy. In mediæval romances, and in Shakespeare's "Troilus and Cressida," he is represented as procuring for Troilus the love and good graces of Chryseis.

Pandects, a collection of laws, systematically arranged, from the works of Roman writers on jurisprudence, to which the Emperor Justinian gave the force of law, 529 A. D.

Pandit, or **Pundit**, a learned Brahman;

Pandours

one versed in the Sanskrit language, and in the sciences, laws, and religion of the Hindus.

Pandora, the first mortal female, according to Hesiod. She was made by Vulcan out of clay, at the command of Jupiter, who wished to punish the impiety of Prometheus by giving him a companion. When the statue was animated, each god and goddess, to make the mortal more captivating and certain to effect the object meditated by the supreme god, bestowed on her some special charm or attribute, beauty, grace, music, wisdom, fascination, and eloquence; while Jove himself presented her with the "Pandora's box," a rare casket full of secret wonders, which could be only opened by the mortal she selected for her husband. When fully armed with all her gifts, and named Pandora from the multiplicity of her presents, Mercury carried her to earth, and presented her to the notice of the arch burglar Prometheus. That crafty and cunning prince, however, though admiring the beauty of the maid, declined the alluring bribe, and refused the offer. His more susceptible brother, however, captivated by Pandora's charms, eagerly asked for and obtained the lovely Pandora for his wife, upon which she presented him with the casket, her dowry from the gods. When Epimetheus, the husband, opened the lid, a host of evils—all the ills and mischiefs that afflict mankind—flew out and spread themselves over the world; and the consequences would have been still more fatal, had there not been Hope at the bottom, to ameliorate the pains and sufferings of life.

In zoölogy, a genus of bivalve mollusks, having unequivalved shells, and found at a considerable depth in the sandy shores of Europe and of the Pacific Ocean. In astronomy, an asteroid, discovered by G. Searle in 1858. In music, a kind of lute, furnished with strings of brass.

Pandours, a people of Servian origin who lived scattered among the mountains of Hungary, near the village of Pandour in the county of Sohl. The name used to be applied to that portion of the light-armed infantry in the Austrian service raised in the Slavonian districts on the Turkish frontier. They originally fought after the fashion of the "free-lances," and were a terror to the enemy whom they annoyed incessantly. Their appearance was exceedingly picturesque, being somewhat Oriental in character, and their arms consisted of a musket, pistols, a Hungarian saber, and two Turkish poniards. Their habits of brigandage and cruelty rendered them, however, as much a terror to the people they defended as to the enemy, and about 1750 they were put under stricter discipline, and gradually incorporated with

Pandy

the regular army. The name is now obsolete.

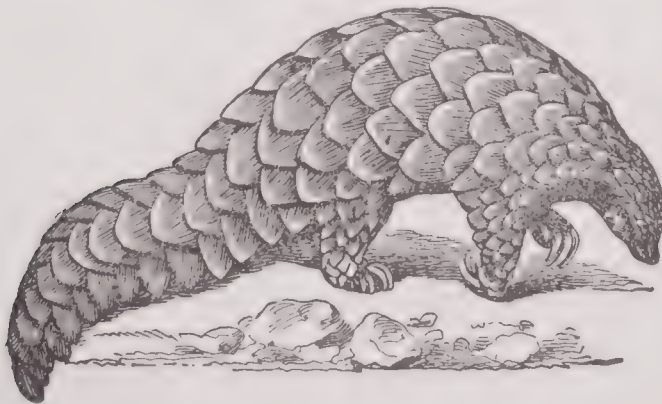
Pandy (from Mungul Pandy, the first Sepoy executed, April 5, 1857, in the Indian mutinies), a nickname given in 1857 to the Sepoys who rose in mutiny, or to other natives of India who supported them by overt acts of rebellion.

Panel, in bookbinding, a depressed part of the sides within a relatively elevated bordering portion; or a space on the back between bands. In joinery, the sunken portion of a door, wainscoting, head-board of a bedstead, etc. Its edges are mortised into the surrounding frame. In law, a parchment or schedule containing the names of persons qualified and summoned by the sheriff to serve on juries. Also the jury. In masonry, a face of a hewn stone.

In mining: (1) A heap of dressed ore ready for sale. (2) A system of coal mining in which the projected winning is divided into large, square allotments, divided by massive walls of coal, instead of placing the whole working in one undivided arrangement. The pillars are left very large, the rooms small; the pillars are worked out, props being substituted; these are knocked out, and the goaf filled up by the caving down of the ceiling.

In painting, a piece of wood — oak, chestnut, or white poplar — on which, instead of canvas, a picture is painted. The earliest paintings in oil were generally executed on panels, which were composed of various pieces of wood, cemented together with cheese glue; and this glue, or cement, caused each portion to adhere so firmly that such panels were considered stronger than those which consisted of one piece of wood only. Strips of linen were usually glued over the joinings of the panel, and, in some cases, the surface was entirely covered with linen, for which purpose animal glue was used.

Pangolin, in zoölogy, scaly ant-eater; the popular name for any individual of the genus *Manis*. They range in size from



PANGOLIN.

one foot to three feet in length, exclusive of the tail, which, in some species, is twice as long as the body; legs short, ears very

Panicle

small, tongue long and vermicular, to which ants are held fast by the copious flow of saliva with which it is lubricated. There are seven species, three from Asia, *M. javanica*, *M. aurita*, and *M. pentadactyla*, the five-fingered pangolin, and four from Africa, *M. macrura*, the long-tailed, *M. tricuspis*, the white-bellied, *M. temminckii*, Temminck's, and *M. gigantea*, the giant pangolin.

Panhandle, The, a descriptive designation popularly given to the N. extremity of the State of West Virginia; a somewhat elongated strip of territory between the W. frontier of Pennsylvania and the Ohio river. Also the N. W. projection of Texas.

Panic, a sudden flight or alarm, especially one without any real cause or ground; sudden flight or terror inspired by some trifling cause. A commercial panic, a panic produced in commercial circles. When such a panic takes place a run commences on the banks, the price of securities falls, and other abnormal commercial conditions ensue. Panics, financial and commercial, most notable since 1750, are as follows:

- 1763 Amsterdam. Heavy failures in Holland, England, and Hamburg.
- 1773 Holland. Failures exceed \$50,000,000 sterling.
- 1793 England, owing to French war. Government issued \$25,000,000 Exchequer bills.
- 1799 England. Panic at Liverpool. Government lent \$2,500,000 in Exchequer bills on goods.
- Eighty-two failures at Hamburg.
- 1814 England. 240 banks stopped payment.
- 1825-1826 England. 770 banks stopped payment owing to failure of South Sea bubble companies. Owing to the distress occasioned by the consequences of this panic, families in Yorkshire were reduced in 1829 to live on bran, and machinery which cost \$3,000 was sold for \$120. From the same cause about 200,000 families emigrated to the Continent, America, etc., in four years.
- 1831 Calcutta. Failures, \$75,000,000.
- 1837 United States. "Wild Cat" crisis.
- 1847 England. Owing to excessive railway speculation. Failures, \$100,000,000. Discount rate, 13 per cent.
- 1857 United States. Failures \$555,000,000. Minor crisis in England.
- 1866 London. Owing to over-speculation, Overend, Gurney & Co. and many other bankers failed. Total failures, above \$500,000,000. The last of the serious panics.
- 1873 United States. Heavy failures in New York and elsewhere.
- 1884 Grant & Ward and Marine Bank failures.
- 1885 London. Much temporary disturbance owing to expected Russian war.
- 1890 London. Baring crisis. Liabilities guaranteed by English banks.
- 1892 Financial crash in Australia.
- 1893 United States. The silver crisis, also by some attributed to fear of changes in the tariff by the Democratic party.

Panicle, in botany, a kind of inflorescence, in which the flowers are arranged on a lengthened axis, with branched peduncles and lengthened centripetal clusters of flowers. A panicle may be simple, *i. e.*, bear single flowers, or it may be what Willdenow

calls deliquescent, *i. e.*, the rachis itself may cease to exist as an axis. The corymb, thyrses, and cymes are modifications of the panicle. A panicle is a compound raceme, bearing secondary racemes instead of single flowers.

Panicograph, a mode of obtaining printing plates direct from a subject or transfer by applying it to the face of a plate of zinc, and building up a printing surface in relief corresponding to the design transferred.

Pānini, the greatest known grammarian of ancient India, whose work has up to the present day remained the standard of Sanskrit grammar. Of his life little is known save that he was born near Attock. His date even has not been ascertained. Goldstücker placed him in the 7th century B. C.; Weber and Böhtlingk give about 350 B. C. The precision of statement and analytical skill of his work are equally admirable.

Panipat, a town of the Punjab, India; 53 miles N. of Delhi, near the old bank of the Jumna, and on the great military road of Northern India between Afghanistan and the Punjab. Hence it has been at various times the scene of strife between the people of India and her invaders. The first great battle of Panipat was fought in 1526, when Baber, at the head of 12,000 Mongols, defeated the army, 100,000 strong, of the Emperor of Delhi. The second great battle was fought in 1556 by the Mongols under Akbar, grandson of Baber, and third of the Mogul emperors, against Hemu, an Indian general of the Afghan Sher Shah, the latter being defeated. The third battle was fought Jan. 7, 1761, between Ahmed, ruler of Afghanistan, and the till then invincible Mahrattas, who on this occasion suffered a total defeat and great slaughter. The existing town is enclosed by an old wall, and manufactures copper utensils, cloth, blankets, hardware, silver and glass ornaments. Pop. (1901) 26,914.

Panizzi, Sir Anthony, an Italian patriot; born Sept. 16, 1797, in Brescello, in the duchy of Modena, Italy. He studied at Padua, and became an advocate, but, sharing in the revolution of 1821, had to flee. Condemned to death in absence, he settled in Liverpool, where the friendliness of Roscoe procured him employment as a teacher of Italian. Through Brougham's help he was in 1828 made Professor of Italian in University College, London, and in 1831 assistant librarian in the British Museum. As keeper of the printed books (1837) he undertook the new catalogue, and it was he who designed a new reading room. From 1856 to 1866 he was principal librarian. He was long a fast friend and correspondent of Prosper Mérimée, was made K. C. B. in 1869, and retained to the end

a lively interest in the cause of Italian freedom. He died April 8, 1879.

Panjin. See GOA.

Pannonia, a large extent of country in Europe, bounded on the N. by the Danube, S. by Illyricum and Mœsia, E. by the Danube, and W. by Noricum, inhabited by Celtic tribes, and including the parts now known as Hungary and the Duchy of Austria. It was attacked by the Romans, under Octavianus, 35 B. C., and made a Roman province by Tiberius in 8. It was ceded to the Huns by Theodosius II. about 447, came into the hands of the Ostrogoths at the death of Attila in 453, and to the Lombardi (527-565), from whom it passed to the Avari in 568. The Ungri, or Hungarians, settled here in 889; and from them a large part of Pannonia received the name of Hungary.

Panopolis. See EKLIMM.

Panorama, a painting of a complete scene, viewed from a central point, or made continuous on an unrolling canvas, as if the spectator were passing the particular spots consecutively. The invention of the panorama is due to Barker, a portrait painter of Edinburgh, who obtained a patent for his invention in 1787. Of late years, the verisimilitude of panoramas has been greatly increased. The spectators stand on a central platform, and the painting forms the boundary of a circular building, while the space from the platform to the painting is realistically treated. This has been done with great effect in panoramas of battle scenes, the foreground being strewn with shattered arms, lay figures of men and horses, and the juncture of the mass and the painting so skillfully effected that it is difficult to tell where one ends and the other begins.

Panormus. See PALERMO.

Panos, a tribe of Indians in Peru who were formerly very numerous. During the 17th century the missionaries persuaded many of them to gather in the mission villages. They were of a rather low grade, but understood hieroglyphic writing on bark. When the missions were broken up, in 1767, most of the Panos returned to their savage life, forming numerous small tribes. They have always been friendly to the whites.

Panpipe, the earliest form of a compound wind instrument, undoubtedly the precursor of the organ. It was the *surigx* of the Greeks, *fistula* of the Romans, and probably the *ugab* of the Hebrews. It was formed of seven, eight, or nine short hollow reeds, fixed together by wax, and cut in graduated lengths so as to produce a musical scale. The lower ends of the reeds were closed, and the upper open and on a level so that the mouth could easily pass from one pipe to another. Called also

Pan's pipes, pandean pipes, and mouth organ.

Pan=Presbyterian Council, a body composed of all of the various branches of the Presbyterian and the Reformed Churches throughout the world, including the Cumberland Presbyterian, the United Presbyterian, the Scotch Presbyterian, the Dutch Reformed, the German Reformed, the Reformed Presbyterian, the Waldenses, the Huguenots and all other adherents of the Calvinistic faith. They represent about 35,000,000 communicants, located in 20 nations in different parts of the world, not including the missionary stations. The alliance is the largest regularly established religious organization in existence. It meets once in four years, and was organized chiefly by the late Dr. James McCosh and the late Dr. Philip Schaff. Its first meeting in the United States was in Philadelphia in 1880. It has no ecclesiastical power or authority. It cannot alter the canons or affect the discipline of the Church, but is simply intended to promote fellowship, interest and enthusiasm among the believers in the Calvinistic doctrines. The meeting for 1899 was held in Washington, D. C., beginning Sept. 27, and as it was the 25th anniversary of the organization of the council, and the close of the century, the reports and addresses were somewhat of a historical character. Between 200 and 300 delegates were present, among them the most influential men in the Presbyterian Church throughout the world.

Panslavism, a project or movement for the union, in one confederacy, of all the Slavic races, politically and socially.

Pantagraph. See PANTOGRAPH.

Pantellaria, a volcanic island in the Mediterranean, 36 miles in circumference, and lying 60 miles S. W. of the Sicilian coast. In the chief town (Pantellaria) is a great convict prison.

Pantenius, Theodor Hermann, a German novelist; born in Mitau in Courland, Germany, Oct. 10, 1843. Under the pseudonym of "Theodor Hermann" he wrote: "Wilhelm Wolfschild" (2d ed. 1873); "Alone and Free" (1875); "Ruddy Gold" (1881); "Stories from Courland" (1892); etc.

Panthays, a Mohammedan community occupying the province of Yun-nan in the S. W. of China, who asserted their independence in 1855. In 1859 they captured Talifoo, the second city of the province, and in 1858 the capital. Their leader Wen-soai (King Suleiman) established his authority over about 4,000,000 of people, of whom not above a tenth were Mohammedans. In 1866 the Chinese government recognized the independence of the Panthays, and in 1872 their king sent his son Hassan on a mis-

sion to Europe. Meanwhile the Chinese again attacked the Panthays, defeated them utterly, and finally suppressed their empire. Panthays is an anglicized form of *Pan-si*, their own name. They are still numerous.

Pantheism, the view that God and the universe are identical. It was taught in India in the Vedantic system of philosophy, one of the six leading schools of thought, and to this day it is widely accepted, both by the instructed Brahmins and by the common people. Pantheism is believed to have been the creed of various Greek philosophers, as of Anaximander of Miletus (610-547 B. C.), and Xenophanes (540-500 B. C.). It was held by John Scotus Erigena, A. D. 874. In the latter part of the 12th century it was taught by Amalric of Chartres, a dialectician and theologian. Pope Innocent III. forced him to recant his views, notwithstanding which his bones were dug up and burnt in 1209. John, Bishop of Strasburg, in a rescript against the Brethren of the Free Spirit, published in 1317, attributed to them this, among other tenets, "God is formally whatever exists." By many Spinoza is considered to have revived pantheism, but his teaching in this respect has been misunderstood (see SPINOZISM). In the pantheism of Schelling God is considered as the Absolute Being, revealing Himself in external nature and in human intelligence and freedom, thus closely approaching the dictum of St. Paul, "In Him we live, and move, and have our being" (Acts xvii: 28; Col. i; 17). It is noteworthy that the Greek poet Aratus, quoted by St. Paul, is distinctly pantheistic, and his lines might have served for the germ of the better known, but not less beautiful passage in Vergil (Georg. iv: 219-227).

Pantheon, a famous temple at Rome, built by M. Agrippa, son-in-law of Augustus, about 27 B. C., and dedicated to Mars, and Jupiter the Avenger, in memory of the victory obtained by Augustus over Antony and Cleopatra. The Pantheon is now commonly called the Rotunda, from its circular form. It was given to Boniface IV. by the Emperor Phocas, A. D. 609, and dedicated as a Christian church to the Virgin and holy martyrs, and 830 Gregory IV. dedicated it to all the saints. It is the finest specimen of a circular building not surrounded by columns. The external diameter is 188 feet, and the height, exclusive of the flat dome surmounting the upper cornice, 102 feet, the dome being 36 feet high. The porch is octastyle, and is 103 feet wide. The two square towers on the summit of the building, called in Rome "asses' ears," have been recently removed. There is an excellent cast of the Pantheon in the Metropolitan Museum of Art, New York city. Also all the deities collectively worshiped by a nation; the divinities of a

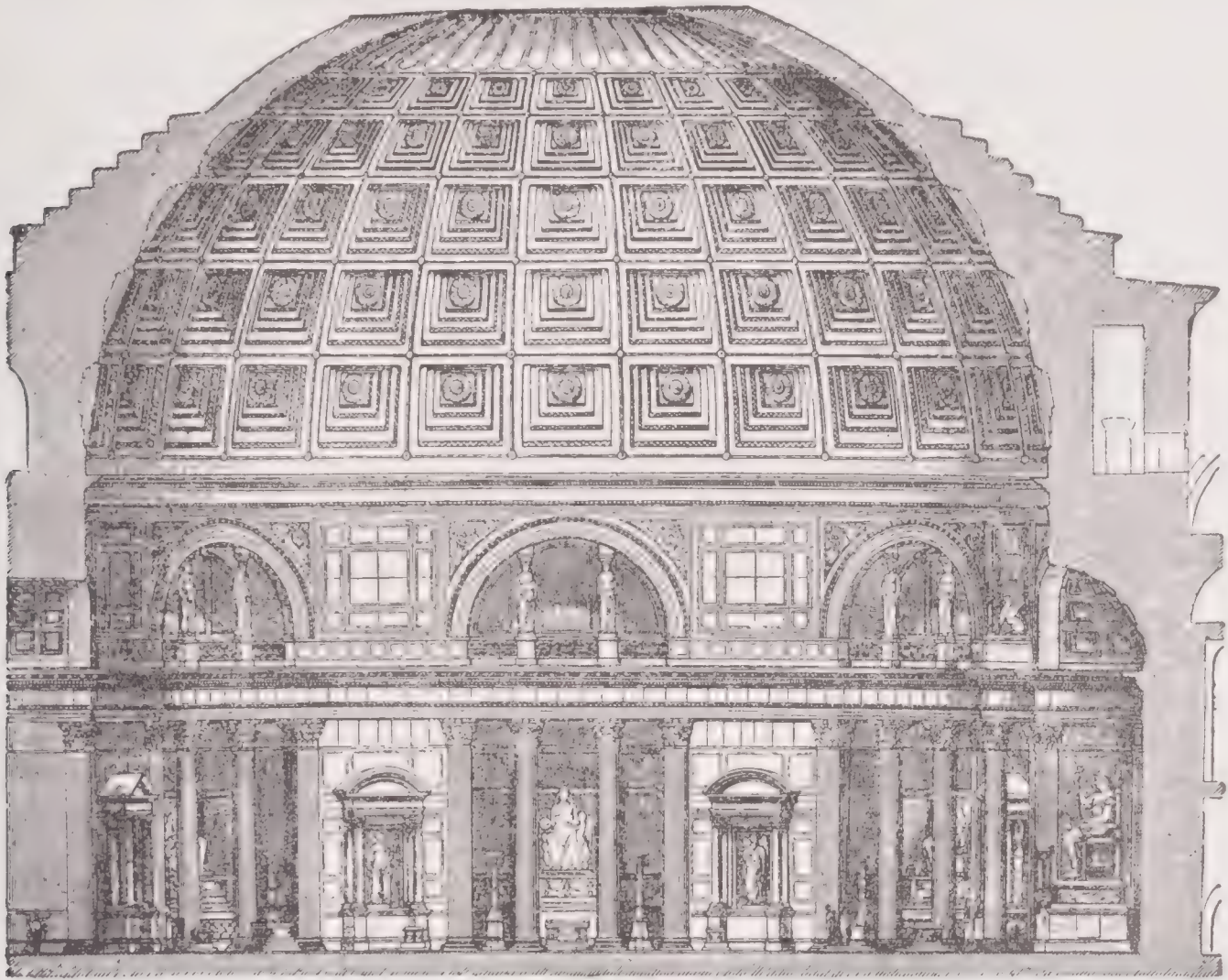
Panther

nation; and a treatise or discourse upon the collective body of deities of a nation.

Panther, one of the *Felidæ* or cat tribe, of a yellow color, diversified with roundish black spots, a native of Asia and Africa.

Pantograph

allow for the variation. The divisions of the hours and their functions are carried on to an additional exterior circle, correspondingly divided, and to a fixed circle round the dial, on which are inscribed the



PANTHEON IN ROME:, BUILT 27 B. C.; RESTORED A. D. 202.

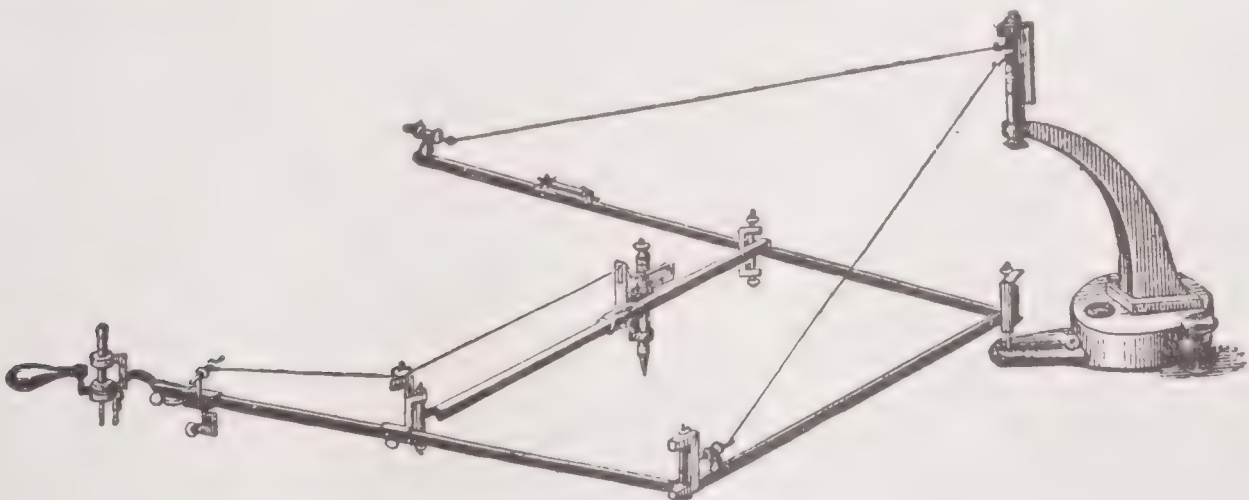
The panther is now supposed to be identical with, or a mere variety of the leopard. The name panther (in vulgar language painter) is given to the puma in America.

Panticapæum. See KERTCH.

Pantochronometer, an instrument which is a combination of the compass, sun

names of a number of places. By this arrangement the gnomon gives the time at the place of observation, and also for any other place inscribed upon it.

Pantograph, or **Pantagraph**, an instrument used in copying plans, maps, and other drawings, so that the copy may be either



PANTOGRAPH.

dial, and universal sun dial. A sun dial is attached to a magnetic needle, suspended in the usual way, in such a manner as to similar to, or larger, or smaller than the original. The principle of the pantograph is all that could be desired in the way of

Pantomime

perfection; but it is found in practice, on account of the numerous joints and the necessary imperfections in its mechanical construction, that it is far from being an accurate instrument. The pantograph is principally useful to the draughtsman in enabling him to mark off the principal points in a reduced copy, through which the lines may afterward be drawn by the usual methods of construction. For this purpose it is found to work successfully.

Pantomime, a theatrical representation, in which the entire plot is exhibited by gesticulations and scenic agency, without speeches or conversation. The ancient pantomime were persons who could mimic all sorts of actions and characters, and were first introduced on the Greek stage to imitate, by actions of feature, hands, and body, the substance or plot of what the chorus was singing; subsequently, they were employed as a sort of interlude to divert the audience after the chorus and actors had left the stage; and, finally, the pantomime became a separate performance, and formed a species of entertainment of its own.

Paola, St. Francis of. See FRANCESCO DI PAULA.

Paoli, Pasquale, a Corsican patriot; born in 1726. His father, Hyacinth, was, in 1735, elected one of the chief magistrates of the island, and subsequently acted as a leader in the revolt against the Genoese. On being compelled to quit Corsica, he retired to Naples with Pasquale, who was placed in the military college of that city. In 1755, being invited by the Corsicans to become their captain-general, he put himself at the head of his countrymen, and, during 12 years, waged a fierce war with the Genoese, who were in the end driven from almost every fort in the island. Genoa, however, gave up the island to France in 1765; and soon afterward a large force was landed, under the command of Count Marbœuf, against whom Paoli and his followers fought desperately. But the Corsicans being totally routed at Pontenuovo, the island submitted. Paoli went to England, where he remained till 1789, in which year, Mirabeau having moved in the National Assembly the recall of all Corsican patriots, Paoli repaired to Paris, and was created by Louis XVI. military commandant in Corsica. While the government of France was monarchic, Paoli remained faithful; but, at the outbreak of the Revolution, he conceived a scheme for making Corsica an independent republic. Till this time he had been on the best terms with the Bonaparte family, but they now joined the Jacobin party, while he allied himself with Great Britain, favored the landing of 2,000 British troops in the island in 1794, and joined them in driving out the French. He then surrendered the island to George III., but becoming dissatis-

Papaveraceæ

fied with the government, he quarreled with the British viceroy, while many of his countrymen were displeased with the course he had adopted in allying himself with the British. He, therefore, left the island in 1796, and went to London, where he died in 1807.

Papa, the Latin form of the title now, in the Western Church, given exclusively to the Bishop of Rome (see POPE). Originally, however, meaning simply "father," it was given indiscriminately to all bishops. In the Greek Church, whether in Greece proper or in Russia, **papa** is the common appellation of the clergy.

Papain, a nitrogenous body, isolated from the juice of the tropical papaw. The juice from which it is extracted is a milky, white, inodorous fluid, obtained by making incisions in the ripe fruit. From this papain is isolated by precipitation with alcohol after the fatty matters present have been removed. The juice has been for a long time used in the West Indies for making meat tender; but it has only recently been shown that papain possesses, like pepsin and trypsin, the power of digesting meat fiber; and this digestion will go on in an alkaline, a neutral, or an acid solution. Hence it belongs to the group of digestive ferments, and like them is employed in some cases of dyspepsia, being either administered internally or employed for the pre-digestion of food. It has also been used for the removal of warts and for the solution of the "false membrane" in cases of diphtheria.

Papal Curia. See CURIA, PAPAL.

Papal States. See CHURCH, STATES OF THE.

Paparrhigopoulos, Constantine, a modern Greek historian; born in Constantinople, Turkey, in 1815. His father was a rich banker of Constantinople, who was put to death during the Greek Revolution of 1821. The son, having escaped to Russia, was educated at Odessa at the expense of the Czar Alexander, and in 1854 became Professor of History at the University of Athens. His principal work, "A History of the Greek People," was translated into French in an abridged form as a "History of Hellenic Civilization." He died in Athens, April 26, 1891.

Papaveraceæ, poppyworts; an order of hypogynous exogens, alliance Ranales. Herbaceous herbs or shrubs, often with milky juice. Leaves, alternate, simple or divided, without stipules. Peduncles long, one-flowered; sepals two or three, deciduous; petals four or six, or multiples of four; stamens indefinite; ovary one-celled, with parietal placentæ; fruit podshaped or capsular; seeds many. Poppyworts are narcotic, emetic, purgative, or acridly poisonous. Two thirds of the species are found in Europe, the others in Asia, Africa, Australia, and

Papaw

tropical America. Known genera 18; species 130 (Lindley), reduced by Sir Joseph Hooker to 17 genera, and 65 species.

Papaw (*Carica papaya*), a small South American tree of the natural order *Passifloraceæ* (formerly made the type of a small family, *Papayaceæ*), which has now been introduced into many tropical and subtropical countries. The fruit is eaten either raw or boiled. The seeds when chewed have in a high degree the pungency of cresses. The powdered seeds and the juice of the unripe fruit are most powerful anthelmintics. The juice of the fruit and the sap of the tree render tough meat tender, even the exhalations from the tree have this property, and joints of meat, fowls, etc., are hung among its branches to prepare them for the table. It bears fruit all the year, and is exceedingly prolific. The *Chamburu* (*C. digitata*), another species of the same genus, a native of Brazil, is remarkable for the extremely acrid and poisonous character of its juice, and the disgusting stercoraceous odor of its flowers. In the United States the name papaw is given to the *Asimina triloba*, a small tree of the natural order *Anonaceæ*, the fruit of which, a large oval berry, three inches long, with soft, insipid pulp, is eaten by negroes, but not generally relished by others. All parts of the plant have a rank smell.

Paper, a material made in thin sheets from a pulp of rags, esparto grass, straw, wood or other fibers, and used for writing or printing on, or for wrapping. The earliest paper was doubtless that made from the Egyptian papyrus, whence all similar writing material is named. In the paper trade, as in other mechanical industries, there has been great progress made in the last half century. Chemists have furnished improved methods for washing, bleaching and coloring the paper stock; while the mechanical improvements also have been many, both for boiling, running out, drying, and finishing the pulp. The vegetable substances from which paper can be made are innumerable. Many books and newspapers have been printed entirely of one material, such as bamboo, straw, jute, *Phormium tenax*, maize leaves, esparto, etc.; at the Paris Exposition of 1889 a paper maker showed more than 60 webs or rolls of paper, each made from a different vegetable fiber, and books have been published which were composed of several hundred leaves, all of a different fiber. In an old German book by Jacob Christian Schäffers, published in 1772, there are no less than 81 samples of different kinds of paper bound up and forming a part of the book, and innumerable others have been made since. In Japan a species of mulberry osier is grown specially for its bark for paper making. Only two vegetable fibers have come into general use

Paper

for paper making; these are esparto and wood pulp. The best sources of fiber are linen and cotton rags for white paper, and hempen cordage for brown; but rags are no longer available in sufficient quantities for paper making, and not all woody fiber is equally well adapted for the production of paper; moreover many vegetable growths yield cellulose at such cost as to be unremunerative. A caustic soda or soda-ash is required in the preparation of many fibers.

Raw fibers may be divided into four classes: (1) that which is easily reduced and easily bleached; (2) that which is difficult to bleach; (3) that which is difficult to reduce but easily bleached; and (4) that wherein perfect bleaching effects the integrity of the fiber. The longer the fibers and the more intricate the mixture of them when wet, the stronger will be the sheet of paper when dry. The shorter the fibers, the less pliable will they become with water, as in the case of ground wood, and the less will be the pressure which individual fibers exert on one another, and the more brittle will be the paper sheet turned out. The culms of various cereal grasses are employed where obtainable; rice straw in Asia, wheat, oat, and other kinds of straw in Europe. Straw was used a century ago for paper making, but its extensive use is of comparatively recent date. For low papers it commands a market, but as a mixture it is inferior to esparto, the internodes or knots being exceedingly troublesome. The deficiency in the supply of rags and the absence of any cheap substance to supplement esparto have led to a great run on wood pulp for the paper mills in most countries. Its manufacture and use dates practically back only to about 1870; indeed its general adoption may be referred to 10 years later. The conifers giving the strongest and toughest fiber seem to be best adapted for conversion into pulp, though many other species are used. The production has centered chiefly in America and the two Scandinavian countries, Norway and Sweden. They also make a large quantity of paper and pasteboard for export. At first the wood was simply rubbed down into pulp against the periphery of a wheel with a rough surface; but now by improved chemical appliances a better pulp is produced, and the manufacture has become generally adopted in Europe and America, adding largely to the value of their forests. Wood pulp is now the principal ingredient in cheap paper. It is deficient in fiber, but a moderate admixture of rags, esparto, or other fibrous material strengthens it. Much of the paper made is used up a second time, old newspapers and books forming much of the material for repulping. Cotton and linen rags are the mainstays of the paper maker, and all countries draw largely on these waste substances. In order to reduce the price many makers introduce

into their pulp sawdust and various mineral matters, such as kaolin or china clay. Very often 25 to 30 per cent. of such substances is introduced into these loaded papers, which do for cheap journals, the sheets of which have no solidity or durability. They are also injurious to the type. Another cause which contributes to the bad quality of many modern papers is the too rapid desiccation which the sheets undergo in the preparation of machine-sized paper. Many of the papers now made are finer, more beautiful, and whiter than those made in former times, but machine-made papers in general possess less strength than the old hand-made papers. Paper of pure and good quality ought not to leave after burning more than 2 per cent. of ash.

The varieties of paper made are chiefly the following four classes: (1) news and printing papers; (2) writing papers of various kinds, blue, cream and yellow laid, and wove and tinted, and for account books, etc.; (3) wrapping or packing papers, brown and purple, heavy manilla for cartridge and bags; (4) miscellaneous, such as light copying, tissue, and pottery papers, blotting and filtering, cigarette, etc. Lastly, there are all kinds of cardboards and millboards made. The principal kinds of papers embrace 2,000 names of various kinds and qualities, among which may be mentioned account-book, backing, bag-papers, bank-note and bill, blottings, boards, bowl-papers, browns (heavy and cutting) butter, caps (brown for bags), cards for looms, carpet-felt, cartridge, casings, chart-papers, cheques, cigarette, collar, colored, copyings, drawings, drying royals, duplex, enamelled, engine-boards (glazed and milled, paste and port-manteau), envelope-paper, filtering, fly-papers, foil or tin-foil, grocery, gun-wadding, hosiery, lithographic, loans, long elephants, manifold, manillas, marbled, middles (browns), mill wrappers, music, news or printings, parchment, pin and needle, plate, railway-tickets, sampling, skips, tissues, tobacco, tracings, tube-paper, water-proof, wrapping, writing. In 1772 there were 60 varieties of paper made from as many different materials, and 10 or 12 years later the number had been extended to 103. In those days all paper was manufactured by hand, each sheet separately. The rags were pulped in mortars by trip-hammers, and several days were required to turn out a sample of dry finished paper. The workman dipped a rectangular sieve or mould into the vat and deposited the sheet of fluid pulp on a piece of felt to dry.

This simple mode of manufacture, which is still largely practised in Holland and Italy, has been superseded very generally by continuous machines, and only a small quantity of paper for special books, editions de luxe, etc., besides a superior writing, bank-note, and drawing paper is now made

by hand. Millboards, and pasteboards or cardboard were formerly chiefly made for bookbinding; but now they are much in demand for box-making, machine-packing, etc. The various machines for making paper in continuous lengths are wonderful productions of mechanical skill, being almost automatic in their action, and working with marvellous exactness. These machines consist of contrivances for causing an equal supply of pulp to flow on an endless wiregauze apron, which revolves and carries on the paper till it is received on an endless sheet of felt, passing around and between large couching cylinders. These machines have now been brought to such perfection that paper can be made in one continuous roll or web of any length, and before leaving the machine is sized, dried, calendered, hot-pressed, and cut into sheets. At the Pittsburgh Exhibition there was a roll 14 miles long, 18 inches wide, and weighing 2,658 pounds. Some of the machines are 75 to 100 feet long and 120 inches wide, requiring a building to themselves, and making a sheet of paper 7 feet in width. In the United States, for fine book-work, the paper receives a white coating after it has been made; the finish thus given to the surface renders possible the illustrations seen in our best magazines. The water mark is impressed on machine-made paper by means of a fine light-wire cylinder with a wirewoven pattern; this is placed over the wiregauze sheet on which the pulp is spread, but near the other end of it, so that the light impression of the marker may act on the paper just when it ceases to be pulp, and this remains all through its course. The productive power of a modern paper-making machine is very great; it moves at a rate of from 20 to 200 feet per minute, spreading pulp, couching, drying and calendering as it goes, so that the stream of pulp flowing in at one end is in two minutes passing out finished paper at the other. It has been computed that an ordinary machine making webs of paper 54 inches wide, will turn out four miles a day.

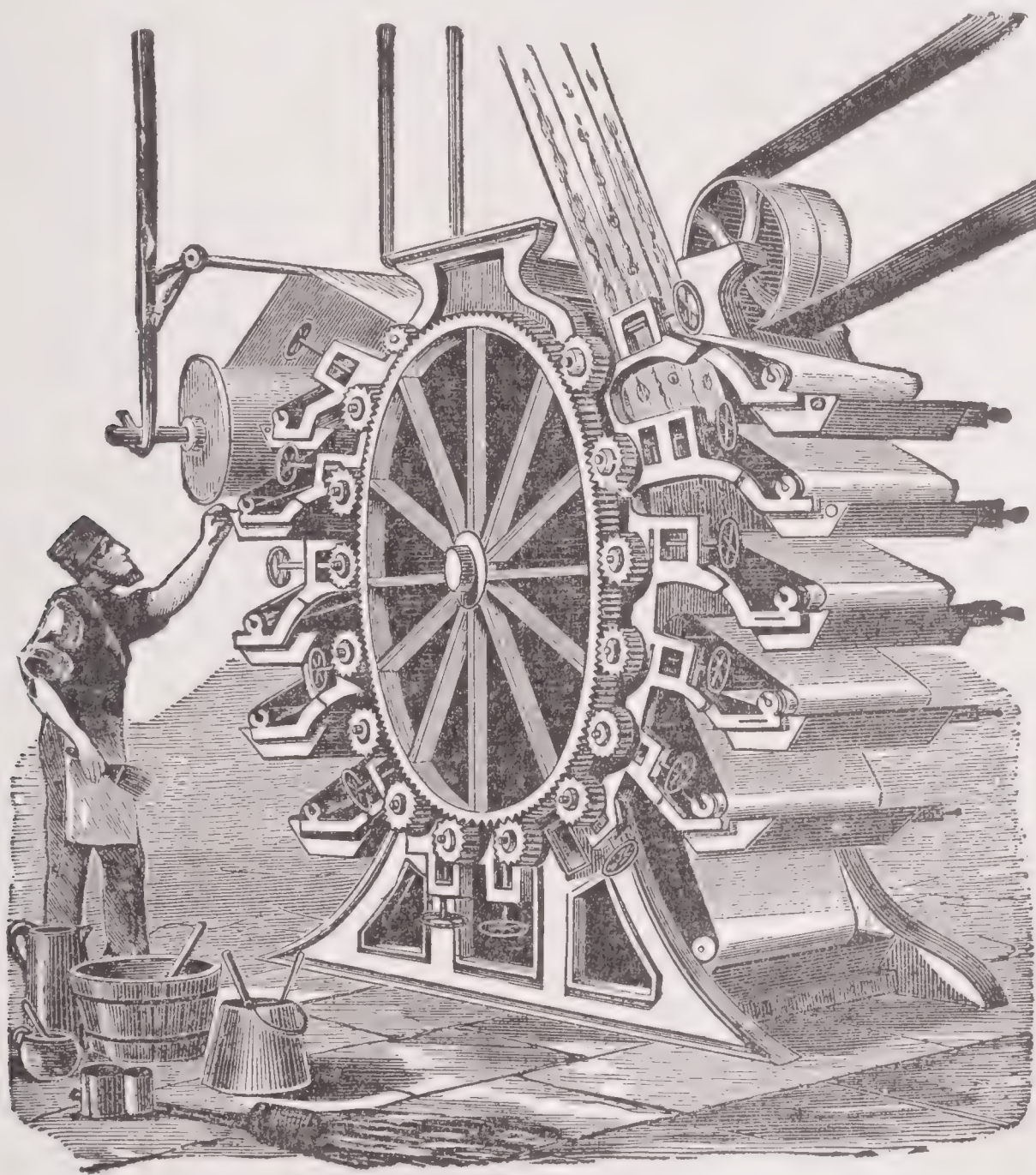
Paper Production of the World.—In the United States great progress has been made in paper manufacture. The first mill was established in 1690 on ground now included within Philadelphia. In 1770 there were 40 paper mills in Pennsylvania, New Jersey, and Delaware, and only three or four in New England. In 1840 there were in the United States 426 paper mills; in 1850, 443; and in 1860, 500, producing 60,000 tons; in 1872 there were 812 mills, owned by 705 firms, making 200,000 tons. At present, with over 1,000 paper mills having 3,000 machines, the quantity made greatly exceeds that of Great Britain; the amount in some of the last years of the decade 1880-1890 amounting to over 1,200,000 tons. In the other parts of America there are 85

paper mills. In Great Britain and Europe there are over 3,000 mills; in Asia there are 19 paper mills, besides numerous vats; in Africa, 4; and in Australia, 7; making a total of nearly 4,500 mills in the world. The production of hand-made papers in China and Japan it is impossible to estimate. China has made great strides in her exports of paper of all kinds. From about 75,000 hundred weight a few years ago the export advanced to 200,000 hundred weight in 1887, valued at £304,000, or \$1,520,000. The great-

er part of the paper now made in the world — at least three-fourths — is believed to be used for printing on, since the correspondence carried on in many countries outside of Europe is comparatively small.

Paper Hangings. Since this important substitute for the ancient "hangings" of tapestry or cloth came into use about 200 years ago, the manufacture has undergone a gradual succession of improvements, and has now reached a high state of beauty and perfection. The papers intended for paper-hangings are, in the first instance, cov-

ered with a uniform layer of color which is to form the ground, and this is done even in the case of papers which are to have a white ground. The colors thus laid on, and those which are applied by the machine are composed of finely ground coloring matters mixed with thin size or glue to a suitable consistence, and the ground-tint is given by bringing the upper surface of the paper, as it is mechanically unwound from a great roll, into contact with an endless band of cloth emerging from a trough containing



MACHINE FOR PRINTING WALL PAPER.

these, excellent results are obtained, as a correct adjustment of the positions of the parts of the pattern can always be secured. The latter is the mode of printing mechanically on rollers, corresponding with the type-bearing cylinders of the machines already described, but for pattern-printing on paper they are made of fine-grained wood, mounted on an iron axle, and they are carved so that the design to be printed stands out in relief on their surface. It should be clearly understood that each color in the pattern on a wall paper requires a separate roller, the design cut on which corresponds only with the forms the particular color contributes to the pattern. Such rollers being necessarily somewhat expensive, as the pattern is usually repeated many times over the cylindrical surface, the plan has been adopted of fastening a mass of hard composition in an iron axle, and when this has been turned to a truly cylindrical surface it is made to receive plates of metal, formed of a fusible alloy of lead, tin, and nickel. The production of paper-hangings has become a large and remunerative business in the United States, where the very finest class of goods in this line are now turned out.

Paper Money. The making of the artistic green and black notes used in the United States as currency is more complicated than might be imagined from a casual glance at their gracefully lined surface. The lengthy process is most unique and interesting, and a visit to the Bureau of Engraving and Printing in Washington, where it may be seen, is a very entertaining one. The largest face value of any issue is a registered bond of \$50,000 and the smallest a 1-cent stamp. All of the engravers are specialists in their particular department, and the delicate figures and intricate designs of their work are often marvels of artistic skill. Portraits of living persons are never put on the notes, and all the figures, vignettes, borders, etc., are engraved separately before they are put on the plates.

The engravers sit, each one below a window, with a screen of ground glass around them, and another of white linen above their heads. Their work is so fine and delicate that the greatest precision and care is required, and the room in which they work is not open to visitors. First the engraver works out his design of face or figure, and after transferring it by hand to a plate of soft steel the plate is hardened and a soft steel roller takes the impression from it. After this roll is chilled another impression is taken on another steel plate, and after this latter has been hardened it is ready for use.

The geometric lathe which makes the borders is so complete and wonderful a piece of mechanism as to almost seem alive. The graceful lines for the borders, backs and

other conventional designs seen on the notes are made by this machine, if, indeed, it may be called one. After a calculation the machinery is set in motion by steam power, the tiny diamond and steel points begin their work, and the result of this mathematical calculation shows on the small section of steel an intricate border or the undulating circular lines with their strange effect of light and shade. This lathe work is one of the surest guards against counterfeiting, for each bit of work represents an abstruse problem.

In the engraving room are two large vaults, in which are kept all the plates, rolls and other implements, the position of head of the department being a very important and trustworthy one, as it is one of the few offices where great confidence is placed in the honesty of one man.

The paper for all the issues is manufactured under the supervision of government officials, and that used for the bank notes, silver certificates, etc., is sent out in sheets large enough to contain four notes. In appearance it is like any other very heavy linen paper, except that it has two perpendicular lines of short, uneven silk threads running through it. On being received it is taken with the blue and white papers for the internal revenue and postage stamps (both water marked) to the "wetting department," as it is called, where it is counted and recounted, and a receipt given for it. Then it is put between wet cloths and pressed, being shifted about every six hours, to insure each sheet an equal amount of moisture. This process lasts about three days, then, after another counting, it is delivered to the printer, who must give a receipt for the sheets given him. At the end of the day he returns another check, stating the quantity received, the number of notes he has printed and the blank or spoiled sheets to be returned.

The printing room is a scene of great activity, with its many presses and workers. Here the paper is again moistened by applying it to a wet board, then it is laid on a steel plate that has been carefully prepared with the ink, which also is made on the premises. There are two workers at each press, usually a man and a woman. The man fills the plate with ink from a roller, then wipes it off, and finally, after dusting his hands with chalk, he gives it a last polishing. Then, after wetting the paper, the woman lays it on the plate, the press is applied, and there remains the clear, clean back of the notes, which must be carefully examined before they leave the printer's hands. This process is repeated each time. The press is a self registering one, and the employes are allowed to spoil a certain percentage of their work, but if they exceed it their labor is deducted.

Then the notes are sent downstairs, and for 12 hours are subject to great heat in an air tight room. In the room adjoining they are again examined, assorted and sent back to receive their "face value" from the plates prepared, showing the denominations and the facsimiles of the signatures of the proper officers.

Then comes the "wet count," as it is called, and, after being dried, the notes are put in a solution of sizing, which gives a greater durability to the paper. After this short process they are again sent to the numbering room, where the edges are trimmed, and the number is put on by a machine, whose every revolution automatically throws the figures one digit higher. In this room they are given the last count and are then sent to the treasury department, where the red seal of the United States treasury is affixed and the single sheet cut into four notes.

Near this room is a great vault, with a double time lock, where all the work, no matter what its stage of development, is sent for the night. It must all be in and all the accounts must balance, or no one is allowed to leave the building. The supply in this vault is always a little in advance of the demand of the treasury, and once in there is no getting it out, except on the requisition of the chief of the division. One man is never allowed in the vault; there must always be two or more in at the same time.

The Bank of England note is 5 by 8 inches in dimension and is printed in black ink on Irish linen water lined paper, plain, white, with ragged edges. The notes of the Bank of France are made of white water lined paper, printed in blue and black, with numerous mythological and allegorical pictures, and running in denomination from the 25 franc note to the 1,000 franc. South American currency, in most countries, is about the size and appearance of American bills, except that cinnamon brown and slate blue are the prevailing colors and that Spanish and Portuguese are the prevailing languages engraved on the face.

The German currency is rather artistic. The bills are printed in green and black. They run in denominations from 5 to 1,000 marks. These latter bills are printed on silk fiber paper.

The Chinese paper currency is in red, white and yellow, with gilt lettering and gorgeous little hand drawn devices. The bills, to the ordinary financier, might pass for washing bills, but they are worth good money in the Flowery Kingdom.

Italian notes are of all sizes, shapes and colors. The smaller bills, 5 and 10 lire notes, are printed on white paper in pink, blue and carmine inks and ornamented with a finely engraved vignette of King Humbert.

The 100 ruble note of Russia is barred

from top to bottom with all the colors of the rainbow, blended as when shown through a prism. In the center, in bold relief, stands a large, finely executed vignette of the Empress Catharine I. This is in black. The other engraving is not at all intricate or elaborate, but is well done in dark and light brown and black inks.

The Australian bill is printed on light colored thick paper, which shows none of the silk fiber marks or geometric lines used in American currency as a protection against counterfeiting.

Paper, Uses of. Paper manufacturers have developed their industry in two ways in recent years, and the results justify all the labor and experiment carried on through the application of science and chemistry. The application of machinery to cheapen the process of converting the raw material into different grades of paper has enormously stimulated paper production in this country.

But a no less important expansion of the paper industry has been in increasing the manifold uses to which paper can be put. Chemistry has been laboring in this field for two decades, and made possible numerous side products that are now manufactured on a large scale.

One of the things in the paper industry that seemed almost incredible a number of years ago was the manufacture of car wheels. But the manufacture of paper wheels is no longer a novelty, and they are made in a great variety of sizes and shapes from those used on roller skates up to a heavy car wheel. Paper has been applied to the construction of hollow telegraph poles, but paper telegraph poles have never proved of any great value.

There have in recent years been made of paper, water and sewer mains which promise to be of value. These are hardened and treated chemically so that they are more impervious to water than some of the iron and earthenware mains. It remains to be proved by actual test whether they can outlast some of the latter. The announcement was made a few years ago that paper window panes had actually been made and used, but though these might admit a certain amount of light to brighten up the interior, they could never be looked through with any degree of satisfaction. Still, a semiopaque glass is often needed for the ceilings of public buildings, where the light admitted must be dimmed and diffused in passing through the substance. Paper window panes have been used in this way with more or less success.

We are not only the greatest producers of paper in the world, but we have adapted it to more practical uses than any other nation. Our machinery for making paper, and for converting it into useful articles of commerce, surpasses that of any two

European nations, and even in France and Germany, where the refinement of paper finishing has for years reached the high-water mark, our machinery is largely used. In fact, it might be said with considerable truth that our paper machinery has outstripped our paper production, the former excelling in extent and variety.

By means of improved machinery and new chemical processes wood pulp can be drawn out into the thinnest imaginable sheets. In this spinning and squeezing the paper does not lose its toughness. Thus thin paper napkins and table cloths are produced and printed with fancy borders and patterns. Some of these articles are almost as tough as linen in resisting an attempt to tear them. Of course they will not stand wetting and soon lose their toughness when moistened. But otherwise they make serviceable substitutes for table linen. Likewise the paper vests and paper underclothing and lining of winter suits are prepared for practical use, and they accomplish nearly all that is claimed for them. The paper vests and lining are made so thin that their weight is practically nothing, and yet they keep out the wind and cold. They are chemically treated, so that they will last a long time. They are also manufactured so that they do not make the rustling sound usually characteristic of paper, and they are pliable enough not to stand out or bulge the cloth in any way.

Waterproofing and more recently fireproofing of paper have occupied the attention of chemists and practical paper makers. Paper made waterproof and as fine as the ordinary napkins and table cloths would prove a boon to many lines of industries, especially at restaurants and hotels. It is said that public eating houses are waiting anxiously for durable paper napkins and table cloths. Waterproof paper is made today, but not in such a way as to be valuable for table use. Waterproof paper sheets are frequently glued to cloth, and in this way the latter is rendered impervious to moisture. This waterproof paper is good, however, only for limited lines of articles.

Lately the paper-pulp mills have been experimenting with fireproof paper. In fireproofing wood it has been found necessary to inject into it under great pressure noninflammable chemicals, and thus either drive out or neutralize the inflammable material of the wood. It has been found that these fireproofing substances can be introduced into the paper pulp much easier than they can be injected into wood. Many attempts have been made to mix the right chemicals in the paper pulp to render the paper made therefrom fireproof. Not a little success has been attained in these experiments. In fact, the experiments in producing fireproof paper paved the way

for making fireproof wood. The wood pulp that is compressed into molds for general household uses, such as for wainscoting, dados, ceilings and moldings, can be made fireproof in the same way as the paper. The fireproofing material is introduced and mixed with the wood pulp when the latter is in a soft, pliable condition, and when hardened through hydraulic pressure the chemicals remain in the wood.

This is one of the most interesting lines of experiments yet attempted by the wood-pulp mills. It opens up a world of new possibilities. Should they succeed in producing perfect fireproof wood pulp, there would be nothing to prevent them from furnishing our builders and marine architects with nearly all the interior wood trimmings in pressed material. The demand for such fireproof wood-pulp products would be extensive. Our Navy Department is demanding such material for their battleships and cruisers, and the builders of the great skyscrapers in our cities are just as anxiously looking around for the same thing. If fireproof wood pulp could be produced satisfactorily it would enter into our daily lives in innumerable ways.

When we consider the great number of household articles already made of wood pulp, it can readily be understood that a fireproof process for paper and wood would be immediately of great value to all. The interior trimmings of railroad cars, ferryboats, ocean and river steamers, public halls and hotels are nearly all made of hard wood treated with oil, so that it is more inflammable than in the natural state. All this trimming of wood forms a daily menace to thousands of people, and should a fire occur it would sweep irresistibly through these handsome steamship saloons and parlor cars. The whole trade is merely waiting for the proper fireproof wood to make revolutionary changes in its methods.

There are innumerable smaller trades built up in recent years as the result of improvements in manufacturing paper. Thus in the electric light business, compressed paper chemically prepared is of great value, and it is employed for insulating purposes on a large scale. Paper is in increasing demand for packing perishable goods. Butter, cheese and similar products packed in waterproof oiled paper will keep twice as long as when wrapped in any other substance. This packing paper is rendered absolutely air-tight. Druggists use large quantities of it for wrapping around the corks of their bottles, and even in sealing up boxes of medicine which need to be kept from the air as much as possible. In this way results are obtained which cannot be approached by any other cheap material. Thousands of tons of fine filtering paper are also used every year in the drug trade.

Papier-maché, a material composed principally of paper. The commoner varieties are prepared by pulping any kind or mixture of different kinds of paper into a homogeneous mass of a doughy consistence. Some earthy material may be mixed with the pulp, as well as chemicals, resinous substances, and glue to harden it and prevent the attacks of insects. The pulp is rolled into thick sheets, and a sufficient quantity is taken to form the article of ornament desired; this is subjected to heavy pressure between cameo and intaglio dies and afterward dried. Its surface may now be gilded, painted with oil or size colors, or varnished. The toughness and lightness of this material peculiarly adapt it for table ware, table and desk furniture, interior architectural and other ornaments.

Papilio, a butterfly; in entomology, the typical genus of the family *Papilionidæ*. It has long antennæ and very short palpi. About 500 species are known, many of them from Africa and the Eastern Archipelago.

Papilionaceæ, in botany, an order of plants founded by Linnæus, now reduced to a sub-order of *Fabaceæ*. The flowers are papilionaceous, the petals imbricated inæstivation, the upper one exterior. Most species of the sub-order are beautiful; the seeds of many are very nutritious to man, while their leaves and flowers afford food to horses, cattle, and sheep. Some are medicinal, some furnish dye-stuff, gum, and timber, many are narcotic, and some poisonous. The sub order is divided into seven tribes. Podalyrieæ, Loteæ, Vicieæ, Hedysareæ, Phaseoleæ, Dalbergiæ, and Sophoreæ. The second, fourth, and fifth have sub tribes, those of Hedysareæ are Arachideæ, Coronilleæ, and Hedysareæ proper. Known genera 295, species 4,700, scattered over the world, a large number in the N. temperate zone.

Papilla, in anatomy, small eminences, more or less prominent, at the surface of several parts, particularly of the skin and mucous membranes, containing the ultimate expansions of the vessels and nerves, and are susceptible in some cases of a kind of erection. In botany, a small, elongated, or nipple shaped protuberance.

Papillon, Marc de, "CAPTAIN LAS-PHRISE," a French poet; born in Amboise, France, in 1555. In 1590 he published a volume of stanzas, songs, elegies, epigrams, satires, epitaphs, etc. His verses are graceful and enlivened with wit, but many of them are licentious. Toward the end of his life he composed poems on religious subjects; *e. g.*, a versified rendering of the "Canticle of the Three Children in the Fiery Furnace," the "Magnificat" the "Lord's Prayer," etc. He died about 1605.

Papin, Denis, a French physician; born in Blois, France, in 1647. He studied medicine in Paris, practised for some time

as physician, devoted himself subsequently entirely to the study of physics, went to England, where he became member of the Royal Society, in 1681, and was called to the chair of mathematics in the University of Marburg, in Hesse-Cassel. To Papin undoubtedly belongs the high honor of having first applied steam to produce motion by raising a piston; he combined with this the simplest means of producing a vacuum beneath the raised piston, viz., by condensation of aqueous vapor; he is also the inventor of the "safety-valve," an essential part of his "digester." By this latter machine, Papin showed that liquids in a vacuum can be put in a state of ebullition at a much lower temperature than when freely exposed to the air. Papin's sagacity led him to many other discoveries; he discovered the principle of action of the siphon, improved the pneumatic machine of Otto de Guericke, and took part against Leibnitz in the discussion concerning "living" and "dead" forces. He died in 1714.

Papineau, Louis Joseph, a Canadian statesman; born in Montreal in October, 1789. At 20 he was elected to the Legislative Assembly, and speedily worked his way to the head of the Radical or French Canadian party, and in 1815 was chosen speaker of the House of Assembly for Lower Canada, a post that he held till 1837. He opposed the union of Upper and Lower Canada, formulated the grievances and demands of his party in the Ninety-two Resolutions, and agitated actively against the imperial government. When the province rose in rebellion in 1837, a warrant was issued against Papineau for high treason, though he took no active part in the fighting. He escaped to Paris; but returned to Canada, pardoned, in 1847. He died in Montebello, Quebec, Canada, Sept. 23, 1871.

Papinianus, Æmilius, down to the time of Justinian the most celebrated of the Roman jurists, lived at Rome during the reign of Septimius Severus, whose second wife is said to have been his relative. Both he and Septimius were pupils of Scævola; Papinianus succeeded the prince as secretary of the treasury, and afterward held the office of prime minister. The son and successor of Severus, Caracalla, caused Papinianus to be put to death in 212. His works consist of 37 books, from these works 595 excerpts were incorporated in Justinian's "Pandects."

Papion, Cynocephalus sphinx, a species of dog-headed baboon, akin to the mandril. It was held in great reverence in Egypt, selected individuals being kept near the temples, in the caves of which their mummied forms have been often found.

Pappenheim, Gottfried Heinrich, Count of, a German imperial general in the Thirty Years' war born in Pappenheim, Bavaria, in 1594. He distinguished himself in the battle of Prague as colonel, in 1620; in 1623-1625 served in Lombardy as commander of a regiment of cuirassiers (the Pappenheim dragoons). In 1626 he con-



COUNT OF PAPPENHEIM.

quered, with the assistance of the Bavarians, 40,000 peasants in Upper Austria, and in 1630 joined Tilly, who ascribed the loss of the battle of Leipsic in 1631 to his impetuosity. He appeared on the field of Lützen on the side of Wallenstein, but was mortally wounded, and died the day after the battle, in 1632.

Pappus, the calyx of composite plants; usually consists of hair like processes, arising from the apex of the ovary, when it is said to be pilose; in other cases it is plumose, setose, paleaceous, marginate, etc.

Pappus of Alexandria, a Greek mathematician; flourished about the end of either the 3d or 4th century A. D. Suidas states that Pappus was a contemporary of Theon, thus placing him toward the end of the 4th century, and ascribes several treatises to him. These treatises have not survived, and the only work by which Pappus is now known, his "Mathematical Collection," receives no mention from Suidas. From the 7th book, which is the longest and most valuable of the "Collection," is derived a large part of our knowledge of Greek geometry. Many of the writings are no longer extant, and it is on the indications which Pappus gives of the objects or the contents of them that geometers of the 17th and 18th centuries relied for their restorations of

these writings. The 8th book is devoted mainly to mechanics. The mathematical interest of the "Collection" does not equal the historical, but several of the books contain important theorems, the discovery of which is probably due to Pappus himself. One of these has been long associated with the name of Guldinus (1577-1643). Some others have received a brilliant development from the mathematicians of modern times. The last six books of the "Mathematical Collection" were translated into Latin by Commandinus, an Italian geometer, and were published in 1588; another edition appeared in 1660. Fragments of the Greek text have been printed at various times in England, France, and Germany, but the only complete edition is that of Fridericus Hultsch (Berlin, 1876-1878).

Paps of Jura, a fanciful name given to three peaks on the island of Jura in the Hebrides.

Papua. See NEW GUINEA.

Papula, a pimple; a small acuminate elevation of the cuticle on an inflamed base, seldom containing a fluid or suppurating, and commonly terminating in scurf. Papulæ are an order of skin diseases established by Wilan. It contains Strophulus, Lichen, and Prurigo.

Papyrus, in botany, a genus of *Cyperæ*, having the inflorescence in spikelets, with many flowers, surrounded by long bracts; the seeds three cornered. *P. antiquorum*, sometimes called *Cyperus papyrus*, is the plant from which the ancients made paper. It has an underground stem, at intervals sending up ordinary stems 8 or 10 feet high. It grows on the banks of the Nile, the Jordan and in the S. of Italy. The paper was made from thin slices of the stem cut vertically. It was made also into boats, and its fibers used for cordage. *P. corymbosus*, or *Pangorei*, is manufactured into Indian mats; also in literature, rolls of papyrus with writings on them constituting an ancient book. Many such papyri have been found at Herculaneum and Pompeii, the former partially legible, the latter wholly obliterated.

Par, a word used to denote a state of equality or equal value. Bills of exchange, stocks, etc., are at par when they sell for their nominal value, above par or below par when they sell for more or less.

Para, the 40th part of the Egyptian piastre, worth about one-eighth of a cent. It is sometimes called the fuddah. The para of Servia is equal to one-fifth of a cent.

Pará, the name which the Tocantins river receives in its lower course, from Cameta downward (138 miles). It is 20 miles broad opposite the city of Pará, and 40 miles broad at its mouth. The Paranan, an arm of the Amazon, which cuts off Marajó Is-

land from the mainland, pours into it part of the waters of the great river.

Pará (official name Belém), a thriving city and seaport of Brazil, capital of the State of the same name, on the E. bank of the Pará river, 70 miles from its mouth, on a point of land formed by the entrance of the Guandú. The harbor is nearly landlocked by wooded islands, and admits vessels of large size. Pará, as a whole, is a plain looking commercial town, compactly built, without straggling suburbs, the dense tropical forest coming close up to the outskirts. The streets are narrow, but regular, well shaded with mangoes and palms, and partly paved; many of the houses, with their blue and white tiled roofs and white-washed walls, are very pretty. Tram cars and telephones are in general use, and there is a railway to BragANÇA (108 miles). The principal buildings are the theater the government building, custom house, and cathedral (1720). The city contains a small fort and botanic gardens. The place is not unhealthy, though the wet season extends over nearly two-thirds of the year. Pará, the headquarters of the Amazonian Steamboat Company and others, in the emporium of the Amazon river trade, supplying the towns of the interior with foreign goods, and exporting india-rubber, cacao, Brazil nuts, the *piraucu* fish, etc. The annual value of the exports exceeds \$12,500,000. Pop. (1908) 120,000.

Parable, a comparison, a similitude; specifically a fable or allegorical relation or representation of something real in life or nature, from which a moral is drawn for instruction. It differs from an apologue, in that it relates or represents things which, though fictitious, might happen in nature. An allegorical or mystical saying or expression; a proverb.

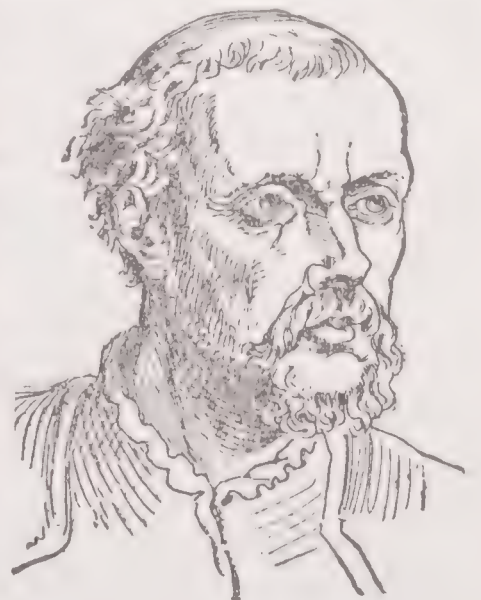
Parabola, in conic sections, a plane curve of such a form that if from any point in the curve one straight line be drawn to a given fixed point, the other perpendicular to a straight line given in position, these two straight lines will always be equal to one another. The given fixed point is called the focus of the parabola. The straight line given in position is called the directrix. A straight line drawn perpendicular to the directrix, and cutting the curve, is called a diameter, and the point in which it cuts the curve is called the vertex of the diameter. The diameter which passes through the focus is the axis, and the point in which it cuts the curve is the principal vertex. A straight line which meets the curve in any point, but which when produced both ways does not cut it, is called a tangent to the curve at that point. A straight line drawn from any point in the curve, paral-

lel to the tangent at the vertex of any diameter, and terminated both ways by the curve, is called an ordinate to that diameter. The ordinate which passes through the focus is called the parameter of that diameter. The part of a diameter intercepted between its vertex and the point in which it is intersected by one of its own ordinates, is called the abscissa of the diameter. A straight line drawn from any point in the curve, perpendicular to the axis, and terminated both ways by the curve is called an ordinate to the axis. The ordinate to the axis which passes through the focus is called the principal parameter, or latus rectum, of the parabola. The part of the axis intercepted between its vertex and the point in which it is intersected by one of its own ordinates is called the subtangent of the axis. If a tangent be drawn at any point, and a straight line be drawn from the point of contact perpendicular to it and terminated by the axis, that straight line is called a normal. The part of the axis intercepted between the intersections of the normal and the ordinate is called a sub-normal.

Parabolani, in the early Christian Church, a class of men whose chief duty was to attend on the sick and diseased.

Paraboloid, in geometry, a volume bounded by a surface of the second order, such that sections made by planes passed in certain directions are common parabolas. It is a characteristic property of paraboloids that they have no centers except in the extreme cases, when they have an infinite number of centers. There are three varieties of paraboloids, elliptical, hyperbolic, and parabolic.

Paracelsus, a German theosophist, physician, and chemist; born in Einsiedeln, near Zurich, Germany, in 1493. His real name was Philip Theophrastus Bourbast von Hohenheim, but he assumed the high-sounding name of Aureolus Theophrastus Paracelsus. He learned the rudiments of alchemy, astrology, and medicine from his father, and then became a wandering scholar, visiting almost all parts of Europe, and gathering information from physicians, barbers, old women, conjurers, etc. He made some fortunate cures, and announced that he had discov-



PARACELSUS.

Parachute

ered an elixir which would prolong life indefinitely; whereby he made himself, for a time, an immense reputation of physic and surgery in the University of Basle, and there set the example of lecturing in the vulgar tongue. But his arrogance, coarseness of language, and habits of drunkenness and debauchery, soon destroyed his fame and influence, and he lost his professorship, and left Basle at the end of 1527. The rest of his life was spent in roving from place to place, practising medicine, indulging in low habits, and writing his books, which were published in 10 volumes. Notwithstanding all his faults, errors, and absurdities, Paracelsus gave a new direction to medical science, by his doctrine that the true use of chemistry is not to make gold, but to prepare medicines; and from his day the study of chemistry became a necessary part of medical education. He opposed the theories of Galen and Avicenna, and publicly burnt their works at Basle; and their long reign came to an end. Paracelsus made great use of the Cabalistic writers, adopted the grossest pantheism, boasted of his own divine inspiration, and employed many new and barbarous words, and used old ones in new senses, thus obscuring his opinions. He died in Salzburg, in 1541.

Parachute, a device by which a descent is made from a balloon or an eminence. It is a light structure, and affords a large area of resistance to the atmosphere. It is usually in shape like an umbrella, 20 to 25 feet in diameter. It remains closed like an umbrella while the balloon to which it is attached is ascending, opening as soon as the descent begins, the expanded top serving to moderate its velocity.

Parachute Light Ball, a thin iron shell containing two iron hemispheres, the lower of which contains a composition which furnishes the light, and the upper a calico parachute tightly packed. It is fired from a mortar, and when the outer shell, which contains a small quantity of powder, is burst by the action of a fuse, the parachute opens by the pressure of the air, and suspends the lower hemisphere containing the now lighted composition. It burns for about three minutes and is used in sieges to throw a light over the enemy's works.

Paraclete, the being who, both in the authorized and revised versions of the New Testament, is called the "Comforter," alternative renderings being given in the margin of the latter. Advocate, Helper, or Paraclete. He is "the Spirit of Truth" (John xv: 26, xvi: 13), the Holy Ghost (xiv: 26). His function with regard to the world is to convict it in respect of sin, of righteousness, and of judgment (xvi: 8-11) (Revised Version). With regard to the

Paradise of the World

apostles, to recall to their memory the words of Jesus (xiv: 26) with regard to them and Christians generally, to abide with them forever (xiv: 16), guide them into all truth (xvi: 13), to testify of Jesus, and glorify Him (xv: 26, xvi: 13, 14). Montanus in the 2d century, Manes in the 3d, and Mohammed in the 7th century, each claimed to be the promised Paraclete, whom none of the three, however, identified with the Holy Ghost.

Paradise, in architecture, a private apartment; a study, or the private appurtenances to a convent, or a parvis.

In Scripture, in the authorized version, the word paradise does not occur in the Old Testament. The Hebrew word *parades* is found in Neh. ii: 8., where in the authorized version it is rendered "forest," and in Eccles. ii: 5, and Song of Solomon iv: 13, where it is rendered "orchard." The revised version translates the first and second "park" and the third "garden," or, on the margin, "paradise." The word, which was of Aryan origin, specially referred to the tree-studded parks around Persian palaces, and the LXX. applied the word *paradeisos* to the Garden of Eden. The word paradise occurs three times in the authorized version of the New Testament. It was the place to which Jesus and the penitent thief went the day that they died (Luke xxiii: 43). St. Paul was caught up into it, and identified it with the third heaven (II Cor. xii: 2, 4). With analogies still preserved to the earthly Eden, the tree of life is in its midst (Rev. ii: 7; Gen. ii: 9). In theology, paradise is generally used to mean heaven, the place of the blessed.

Paradiseidæ, birds of paradise; a family of passerine birds, "formerly restricted to about eight species of the more typical paradise birds, but in his splendid monograph of the group, Elliott has combined together a number of forms which had been doubtfully placed in several adjacent families." The family differs from the *Corvidæ*, to which it is closely allied, in the outer being shorter than the middle, and longer than the inner toe, the hind toe being very large and equaling the middle in length. In his monograph on the family, D. G. Elliot divides it into three sub-families: *Paradiseinæ*, *Epimachinæ*, and *Tectonarchinæ*.

Paradise Fish, a popular name for *Macropus viridiauratus* (lacépède), from the East Indian Archipelago. Its coloration is brilliant and it is frequently found in aquaria.

Paradise of Brazil, The, a name given to the State of Santa Caterina, on account of its fine climate, fertility and beautiful scenery.

Paradise of the World, the natives of Kongo so call their table-lands. To them

Paradox

the climate is salubrious, and travelers all agree that the scenery is beautiful.

Paradox, a tenet or statement contrary to received opinion; an assertion which is contrary to appearance, and seemingly absurd, impossible, or at variance with common sense, but which may, on examination, be found to be perfectly correct and well founded.

Paradoxes, Country of. See COUNTRY OF PARADOXES.

Paradoxides, in palæontology, the typical genus of the family *Paradoxidæ*. The body is two feet, or more, in length; thorax with 16 to 20 rings; eyes long, reniform, and smooth. *P. davidis*, 22 inches long, from the Menevian rocks, is the largest British trilobite. Sometimes called *Olenidæ*.

Paradoxurus, in zoölogy, palm cat; a genus of *Viverridæ*. Molars $\frac{6}{6}$ — $\frac{6}{6}$; the feet plantigrade; the claws half retractile; no anal pouch; tail convolute. Ten species are known. *P. typus*, the common paradoxure, has a blackish body, with some obscure longitudinal bands on the flanks, a black tail, and a white spot below the eye. It is found in India.

Paraffin, or **Paraffine**, a solid, fatty substance, produced along with other substances in the dry or destructive distillations of various organic matters, such as coal, bituminous shale, lignite, peat, etc., at a low red heat. It is found along with liquid oils in petroleum, and in the native state in coal and bituminous strata, known as fossil wax, ozokerite, etc. Paraffin is a mixture of several hydrocarbons, probably homologues of marsh gas of high atomic weight. When pure it is a colorless translucent, without taste or smell, has a density of about .87, melts from 45° to 65°, boils at 370°, and crystallizes from alcohol in snow-white needles. It is acted on with great difficulty by other substances, hence its name. In the plural, a homologous series of saturated hydrocarbons, having a general formula, C_nH_{2n+2} , methane, or marsh gas, CH_4 , being the lowest in the series. Many of the paraffins are found ready formed in petroleum and other mineral oils. In mining, a name adopted for a group of native hydrocarbons, having the general composition: Carbon, 85.71; hydrogen, 14.29 = 100. It embraces the species urpethite, hatchettite, ozocerite, zietrisikite, and elaterite.

Paraguay, a large river of South America, an affluent of the Parana, rises in the Brazilian province of Matto Grosso, on a plateau of red sandstone, in lat. 13° 30' S., lon. about 55° 50' W., 9,535 feet above sea-level. Pursuing a S. W. course, and after flowing through a level country covered with thick forests, the Paraguay is joined

Paraguay

from the W. by the Jaurú, in lat. 16° 30' S. It then continues to flow S. through the marsh of Xarayes, which, during the season when the stream rises, is an expansive waste of waters, stretching far on each side of the stream, and extending from N. to S. over about 200 miles. The river still pursues a circuitous but generally S. course, forming from 20° to 22° S. the boundary line between Brazil and Bolivia, thence flowing S. S. W. through the territories of Paraguay to its junction with the Parana, in lat. 27° 17' S., a few miles above the town of Corrientes. Its chief affluents are the Cuyaba, Tacoary, Mondego, and Apa on the left; and the Jauru, Pilcomayo, and Vermejo on the right. The entire length of the river is estimated at 1,800 miles; it is on an average about half a mile in width, and is navigable for steamers to the mouth of the Cuyaba, 100 miles above the town of Corumba. The waters of the Paraguay, which are quite free from obstructions, were declared open to all nations in 1852; and since 1858, the great water system, of which this river forms such an important part, was regularly traversed by steamers plying between Buenos Ayres on the Rio de la Plata.

Paraguay, a republic of South America; bounded on the N. and N. E. by Brazil, on the S., S. E., and S. W., by the Argentine Republic, and on the N. W., by Bolivia; area, about 98,000 square miles; pop. (1905) 631,347.

Topography.—A mountain chain called Sierra Amambo, running in the general direction of N. to S., and bifurcating the E. and W. toward the S. extremity, under the name of Sierra Maracayu, divides the tributaries of the Parana from those of the Paraguay, none of which are very considerable, though they are liable to frequent and destructive overflows. The N. portion of Paraguay is in general covered by low, gently-swelling ridges, separated by large grass plains, dotted with palms. There are mountains in the N. E. and N. W. corners. The S. portion is one of the most fertile districts of South America, consisting of hills and gentle slopes richly wooded, of wide savannas, which afford excellent pasture ground, and of rich alluvial plains, some of them marshy, or with shallow pools of water, but a large proportion are of extraordinary fertility and highly cultivated.

Climate and Production.—The climate is temperate, reaching as high as 100° in summer, but in winter being generally 45°. In 1897 the number of cattle was estimated at 1,774,000; sheep, 117,250; horses, 182,833; goats, 49,670; mules and asses, 22,720; pigs, 35,160. The principal industry is the cultivation of tea, of which 6,548 tons were exported in 1897. Other industries are tobacco, timber, and fruit-growing. Beans, maize, and mandioc are also largely cultivated.

Paraguay

Commerce.—In 1898 the imports amounted to about \$2,150,000, and the exports to about \$2,500,000. The principal articles imported are textiles, wines, and rice. The exports include yerba maté or PARAGUAY TEA (*q. v.*), tobacco, timber, and oranges.

Churches and Schools.—Religious toleration is general, but the Roman Catholic is the State religion. Instruction is free and compulsory. In 1897 there were 390 public and private elementary schools, 25,000 pupils in attendance, with 700 teachers. The Council of Education subsidizes private schools, a number of which are under Protestant direction. At Asuncion, the capital of Paraguay, there is a National College, with over 200 students and 15 professors. Education is supported by appropriations from the general taxes, and there is also a special government fund, contributed from the proceeds of custom dues, land sales, etc.

Government.—On Nov. 25, 1870, a new constitution was proclaimed. There is a Congress composed of a Senate and a House of Deputies. The members of both houses are elected by popular vote at the ratio of one senator for every 12,000 inhabitants, and one representative for every 6,000 inhabitants. The executive authority is vested in a president, whose term of office is four years. There are five departments in the president's cabinet, viz., Interior, Finance, Justice and Worship, War, and Foreign Affairs.

History.—The history of Paraguay is highly interesting. It was discovered by Sebastian Cabot in 1526, but the first colony was settled in 1535 by Pedro de Mendoza, who founded the city of Asuncion and established Paraguay as a province of the vice-royalty of Peru. In the latter half of the 16th century the Jesuit missionaries were sent to the aid of the first preachers of Christianity in Paraguay; but for a long time they were almost entirely unsuccessful, the effect of their preaching being in a great degree marred by the profligate and cruel conduct of the Spanish adventurers, who formed the staple of the early colonial population. In the 17th century the home government consented to place in their hands the entire administration, civil as well as religious, of the province; and, in order to guard the natives against the evil influences of the bad example of European Christians, gave to the Jesuits the right to exclude all other Europeans from the colony. From this time forward the progress of civilization as well as of Christianity was rapid. In 1810 Paraguay declared itself independent of Spain, and from that time to the present has existed as a republic ruled by dictators or presidents, some of whom have really been great despots. The central department, in which the capital, Asuncion, is situated, contains nearly one-third of the

Parallax

whole inhabitants; and the capital itself, 45,000. The inhabitants of the towns consist chiefly of whites, or of half-breeds, speaking Spanish. The native population of the provinces are chiefly Guaranis, speaking the Guarani language. In 1865–1870 Paraguay was at war with the combined forces of Brazil, the Argentine Confederation, and Uruguay, and as a result of that struggle lost much territory.

Paraguay Tea, an infusion of the leaves *Ilex paraguayensis*, and that tree itself. The leaves, which when green taste like those of mallow, are roasted, dried, and almost pulverized. Three kinds of it exist; the first, the half expanded buds; the second, the leaves stripped of the ribs; and the third, the leaves unstripped. These are put in a teapot, called maté, hot water added, and, when cool, the infusion is sucked up through a tube. The tea is used generally in central South America. In chemistry, yerba maté. The dried leaves and twigs of *Ilex paraguayensis*. They have been examined by Stenhouse, who found them to contain 1.2 per cent, of caffeine.

Parahyba, capital of the Brazilian State of Parahyba, on the river of the same name, 10 miles from the sea. Its chief buildings are the cathedral and the government palace (formerly the Jesuit college.) A large sugar mill was erected in 1889. At the mouth of the river is a bar; but a railway (12 miles) was built in 1889 to the port of Cabedello, there terminating in a pier in deep water. The annual exports—sugar, cotton, and cottonseed, chiefly to Great Britain—amount to about \$1,000,000. Pop. 32,000. The State, the easternmost in the republic, has an area of 28,854 square miles, pop. 490,784. There is a more important Parahyba river farther S., which enters the Atlantic, in the State of Rio de Janeiro, after a course of nearly 500 miles. It is navigable for 50 miles from its mouth.

Parallax, the difference of direction of a body as seen from two different points. It is generally applied to the direction of the heavenly bodies as seen from the earth's center and from some point of its surface. The parallax is greater the nearer the body and the greater the distance between the points in a direction at right angles to that of the body. For any point on the earth's surface the parallax of a heavenly body is zero at the zenith and a maximum at the horizon, and this maximum value is called the horizontal parallax of the body, and when computed for a radius of the earth equal to that of the equator it is called the equatorial horizontal parallax. The term is also applied to the difference in direction of a body seen from different points of the earth's orbit, the longest diameter of which is insufficient in case of some fixed stars.

Parallel Forces

Parallel Forces, forces which act in directions parallel to each other. The center of a system of parallel forces is the point at which the resultant of the system may be supposed to act, whatever may be the direction of the parallel forces.

Parallel Lines, two straight lines are parallel to each other when they lie in the same direction. It follows from this definition, (1) that they are contained in the same plane; (2) that they cannot intersect how far soever both may be prolonged. Any number of straight lines are parallel to each other when they have the same direction, or when they are respectively parallel to a given straight line.

Parallel Motion, a device invented by James Watt, designed to connect the piston and pump rods of a steam engine with the working beam in such a manner that the former shall move in straight lines. The principle of the mechanism consists in the fact that in every parallelogram, three angles being attached and revolving in arcs of circles, the fourth will continue nearly in a straight line of movement. In music, the movement of two or more parts at fixed intervals, as thirds, sixths. Parallel fifths are under certain limitations forbidden.

Parallelogram of Forces, the name given to a theorem in the composition of forces, stated as follows: If two forces acting on a particle be represented in magnitude and direction by straight lines drawn from the particle, and a parallelogram be constructed having these straight lines as adjacent sides, then the resultant of the two forces is represented in magnitude and direction by that diagonal of the parallelogram which passes through the particle.

Parallelopiped, or **Parallelopipedon**, in geometry, a regular solid bounded by six plane surfaces, or parallelograms, the opposite pairs of which are similar, parallel, and equal to each other. If the parallelograms are squares, the solid is a cube.

Parallels, in military operations, are trenches formed by besiegers to cover their assault, being so named because they generally run parallel with the outlines of the fortress assailed. The communication from one to the other is effected by means of ditches formed in zigzag, so that they may not be raked by the fire of the fortress. Vauban first made use of them in 1673, at the siege of Maestricht.

Parallels, in astronomy and geography, small circles of the celestial sphere or of the surface of the earth which are parallel to the equator, having a common pole with the latter. On the earth's surface they are generally called parallels of latitude, and in the sky parallels of declination.

Paralysis, the loss of the natural power of sensation or motion in any part of the

Paralysis

body. It is owing to some diseased condition of the nervous system, either of the brain or spinal cord, or of the nerves. If the nerves of sensation or their centers be affected, there will be loss of sensation; if of motion, then loss of motion; to the latter of which the term paraylsis is by some exclusively applied. Each of these kinds may again be general or partial, or may have various degrees of severity. It may affect only one nerve or muscle, or it may affect a number. The most usual form is when one side or half of the body is deprived of sensation or motion, or both, called hemiplegia; paraplegia is when the lower part of the body is paralyzed, while the upper retains both sensation and motion; and general paralysis is when the loss of nervous power extends over nearly every part of the body. In hemiplegia, the seat of the disease is one side of the brain, usually that opposite to the affected side of the body; in paraplegia, the lesion is within the spinal cord; and when more limited in extent, the disease usually arises from some abnormal state of a particular nerve. Paralysis frequently follows apoplectic attacks, and this usually in its most severe and dangerous form. The prognosis must be looked on as extremely unfavorable when the attack is sudden, the paralysis extensive and complete, and the loss of consciousness protracted; while, on the other hand, when the paraylsis advances gradually, there is more reason to hope for prolonged life, if not for a complete restoration of health.

Among the other causes that may give rise to paralysis are various injuries and diseases of the brain or spinal cord; as tumors, inflammation, external injuries, etc. When paralysis takes place without any previous apoplectic attack, the premonitory symptoms are a general torpor or lassitude, occasional giddiness, or a sense of weight and pain in the head, and loss of memory. When it is the result of injury of the spinal cord, then, of course, the paralysis takes place instantly. Paraplegia sometimes lasts for many years without greatly interfering with any function except locomotion; but when it occurs during fevers and advances rapidly, it is of very sinister augury, especially if it involves the sphincter muscles of the anus and bladder. Sometimes there is a gradual loss of power in the muscle or muscles affected; and in many cases the loss of power is preceded by severe pains in the part, cramps, a sense of numbness or tingling, and a curious feeling of coldness. Paralysis is not a disease of itself, but only a sign of some disorder of the nervous system, probably at a distance from parts affected. In each case, therefore, the cause of the disorder is to be investigated, and the mode of treatment principally directed to its removal. In very

Paralysis Agitans

many cases, however, little can be done either in the way of cure or alleviation.

Paralysis Agitans, "shaking palsy," a disease of advanced life, progressive in its course, and characterized mainly by tremors of the limbs, occurring independently of muscular exertion, rigidity of muscles, and a tendency in walking to a loss of equilibrium. Treatment has proved of little or no service. The persistent application of the continuous galvanic current seems to have been serviceable in a few cases.

Paramaribo, the capital of Dutch Guiana, on the Surinam, about 10 miles from its mouth. It has broad, tree-shaded streets, with clean wooden houses, painted light gray, and numerous canals and churches. There are also a governor's palace, two forts, a park, etc. The Herrnhuters (Moravian Brethren) are a strong body in the town. Except for the harbor of Nickerie, all the trade of the colony is concentrated at Paramaribo. Pop. (1908) 34,962.

Paramatta, a light twilled fabric with a weft of combed merino wool and a cotton warp. It was invented at Bradford, in Yorkshire, where it is still largely manufactured.

Paramecium, or **Slipper Animalcule**, an infusorian very common in pond water or in vegetable infusions. In shape it is an asymmetrical oval, in length about a hundredth of an inch. If dry grass be steeped in a glass of water for some days, the animalcules dormant about the stems revive and multiply very rapidly. Each paramecium is covered with rows of cilia which lash it through the water and drive food particles into an aperture which serves as mouth. As the food particles enter they take bubbles of water with them, and are moved round and round in the living substance till they are digested or got rid of. There are two (excretory) contractile vacuoles; the large nucleus has a small one (paranucleus) lying beside it; beneath the thin rind there are remarkable eversible threads. A paramecium often divides transversely into two; these two repeat the process, and with continually diminishing size rapid multiplication may thus proceed for a while. It has its limits, however, and then two individual infusorians conjugate, exchange some of the material of their paranuclei, and separate. Thus they seem to renew their youth.

Parameter, in mathematics, a name given to a constant quantity entering the equation of a curve. The term is principally used in discussing the conic sections. In the parabola the parameter of any diameter is a third proportional to the abscissa and ordinate of any point of the curve, the abscissa and ordinate being referred to that diameter and the tangent at its vertex. In

Paraphernalia

all cases the parameter of any diameter is equal to four times the distance from the focus to the vertex of the diameter. The parameter of the axis is the least possible, and is called the parameter of the curve. In the ellipse and hyperbola, the parameter of any diameter is a third proportional to the diameter and its conjugate. The parameter of the transverse axis is the least possible, and is called the parameter of the curve. In all of the conic sections, the parameter of the curve is equal to the chord of the curve drawn through the focus, perpendicular to the axis. The parameter of a conic section and the foci are sufficient data for constructing the curve.

Paraná, a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the New World except the Amazon and the Mississippi. It is formed by the junction of two streams, the Rio Grande and the Parana-hyba, which meet in Brazil, and it discharges itself into the estuary of the La Plata, its course latterly being through the Argentine Republic. Its principal tributaries are the Paraguay and the Salado, both from the right. All the tributaries on its left are comparatively short. Its length, from its sources to its junction with the Paraguay, is probably 1,500 miles, and thence to the sea 600 miles more. In breadth, current, and volume of water, the Paraná has 10 times the magnitude of the Paraguay, which is itself superior to the greatest European rivers. It is an important waterway to the interior of the country, though with obstructions at certain points.

Parapegm, a brazen tablet, fixed to a pillar, on which laws and proclamations were anciently engraved; also a tablet set up publicly, containing an account of the rising and setting of the stars, eclipses of the sun and moon, the seasons of the year, etc., whence astrologers give this name to the tables on which they draw figures according to their art.

Parapet, in architecture, a wall raised breast high; the upper part of a house which is above the springing of a roof and guards the gutter; the upper part of a well, a bridge, a terrace, or balcony, etc. Parapets around the flat roofs of houses in the East are of very ancient date. Also a breast-high defense of earth or stone around a work for shielding troops from the enemy's fire. It is so formed that the earth of the excavation is sufficient for the ramparts and parapets. Inside is the body of the place; outside are the ditch, glacis, etc.

Paraphernalia, in law, property which a bride possesses over and above her dower or dotal portion. It includes all the personal apparel and ornaments which she

Paraphrase

possesses and has used during marriage, and which are suitable to her rank and condition of life.

Paraphrase, a free translation or rendering of a passage; a restatement of a passage, sentence, or work, in which the sense of the original is retained, but expressed in other words, and generally more fully, for the purpose of clearer and fuller explanation; a setting forth in ampler and clearer terms of the signification of a text, passage, or word. In Scotland it is applied specially to 67 versifications of Scripture passages used with psalms and hymns in divine worship.

Parasang, a Persian measure of length, varying in different places from 30 to 60 stadia. According to Herodotus it was 30 stadia, *i. e.*, about $3\frac{3}{4}$ English miles. Used to denote a long distance, as we say a mile.

Paraselene, a faintly luminous image of the moon, with the margins of the disk somewhat undefined. One or more of such mock moons are sometimes seen in a halo surrounding the real luminary. The sight, which is rare here, is common in the polar regions, like the corresponding phenomenon of parhelia, or mock suns. It is believed to be produced by reflection from small plates of ice in the air.

Parasite, in botany, the parasites on plants are either animals or vegetables. Some of the latter are of high organization, as *loranthus* and *orobanche* among exogens, and epiphytal orchids among endogens. Many cryptograms in certain ferns, mosses, lichens, and fungals are parasites. The roots of the more highly organized parasites penetrate the substance of the herb at whose expense they feed, and take up from it nutrient substances already in large measure assimilated. The lower parasites, by means of their cells, penetrate other cells to live in and on them. The former are more destructive to the plant.

In mineralogy, a plumose variety of **BORACITE** (*q. v.*) occurring in the interior of crystals of the same, and resulting from their partial alteration.

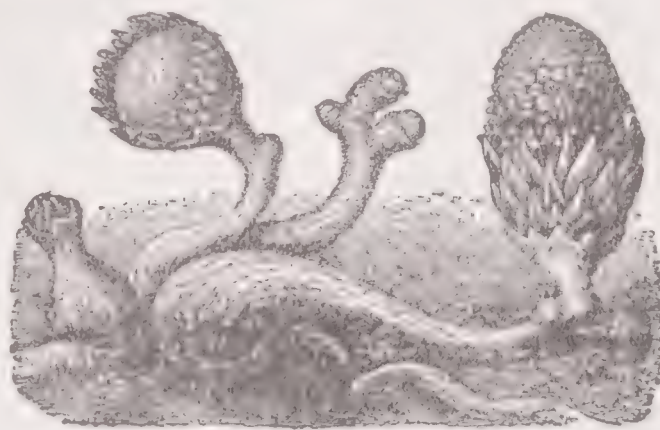
In zoölogy, an animal which lives in, on, or at the expense of the actual substance of another. There is scarcely an animal which does not play the part of host to numerous parasites, and a very large number of the lower Invertebrata are parasitic at some stage of their existence. Parasites may enter the system in the following ways:

- (1) Through the medium of food or drink.
- (2) Eggs are transferred from one animal to another by actual bodily contact, *e. g.*, the eggs of *Pentastomum* by the licking of dogs.
- (3) Eggs are deposited in or on the host, as is the case with those of the *Estridæ*.

Van Beneden divided parasites into three classes: (1) Parasites proper, living at

Parasitic Plants

the expense of the organic substance of the hosts, as the tapeworm; (2) commensals, who live with, or on, but not at the expense of their hosts, as sea anemones often live on shells of hermit crabs, and come in for a share of their prey; and (3) mutualists, a class not clearly defined, and now generally abandoned. Leuckhart divided parasites into ecto- and endo-parasites, according as they lived on, or within, their hosts. Of the latter, by far the larger number belong to the type *Vermes*. Vertebrate parasites are rare, but exist among the *Pisces*. *Myxine* (the hagfish or borer) penetrates the abdominal cavity of gadoids, and feeds on their flesh; the species of *fierasfer*, *encheliophis*, and *echeneis*, and some *siluroids*, are commensals rather than true parasites.



LANGSDERFIA HYPOJAEA.

Parasitic Diseases, an important subgroup in the accepted classification of disease. In these diseases certain morbid conditions are induced by the presence of animals or vegetables which have found a place of subsistence within some tissue or organ, or on some surface of the body of man or other animals. Plants are not exempt from disorders of this nature (see **PARASITIC PLANTS**). The forms of animal life giving rise to parasitic diseases are described in articles on ascaris, cestoid worms, flea, guinea worm, itch, lice, nemathelmia, strongylus, tape worms, thread worms, tick, trichina, etc.

The vegetable organisms which are associated with special diseases are almost all of microscopic size, and therefore, though their effects are of much greater importance than those of animal parasites, they are as yet much less perfectly understood. Certain minute fungi have long been recognized as the causes of disease in the skin and mucous membranes: Favus, pityriasis versicolor, ring-worm, thrush. It was shown in 1861 by Carter that a serious disease of the foot which occurs in India (Madura-foot, fungus-foot, etc.) is due to the presence of a fungus; and in 1877 what is now called actinomycosis was put in the same category.

Parasitic Plants, those which, unable to nourish themselves, prey upon other plants

Parasitic Plants

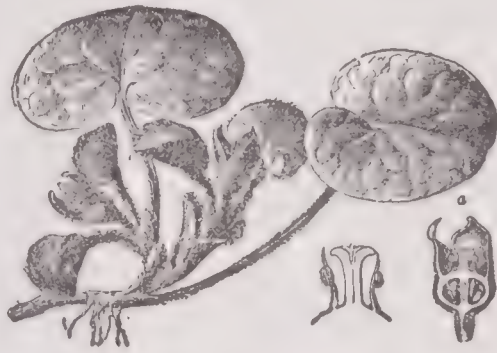
or animals; becoming attached, they gain access to the tissues of their host and feed upon its juices. They are more or less degenerate, according to the extent of their parasitism. Any climbing plant is so far a parasite, but, not drawing any nourishment from its host, merely using it as a support,

Parasitic Plants

which begins life as an independent plant, the seed germinates underground; when the young plant reaches the surface it fastens upon some host, twining round it, sending its haustoria deep into the tissues, and drawing all its nourishment from them; it bears no green leaves, but only flowers,



ARISTOLOCHIA CLEMATIS.



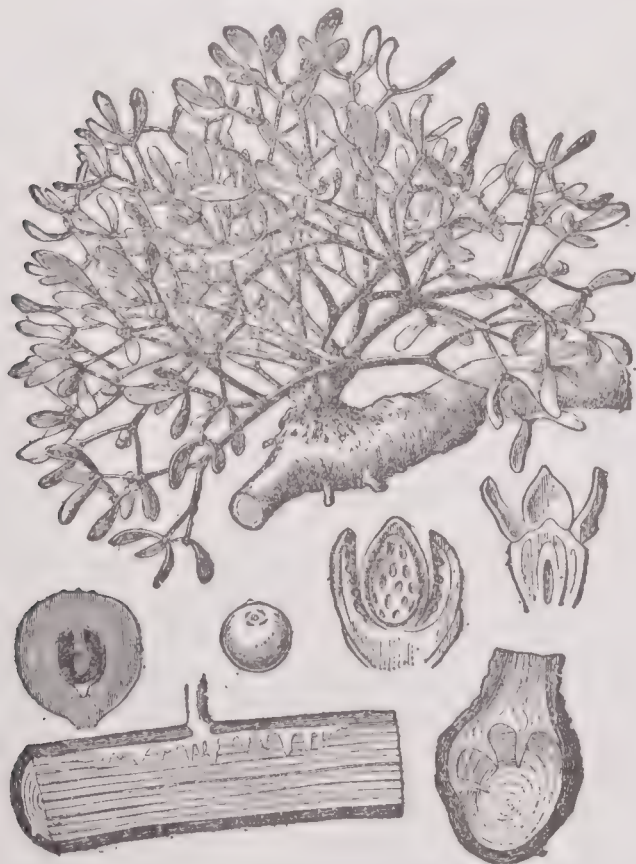
ASARUM EUROPAEUM.



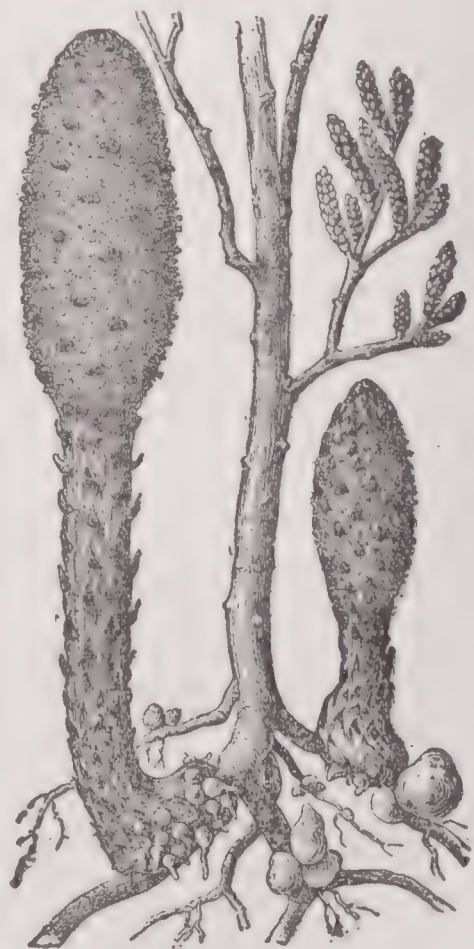
CYTINUS HYPOCERTIS.

it can live without it, and is perfect in all its parts. Many parasites have probably developed from such plants. The mistletoe, on the other hand, has no roots in the ground; its seed is left by a bird on an apple or an oak tree, to which, when it begins to grow, it becomes attached by means

while the part in the ground dies. In the *rafflesiaceæ*, a foreign order, remarkable for the size of the flowers of some of its genera, the degradation has gone still further, and the whole plant consists of haustoria, a knob-like mass of tissue half formed by the host, and the flowers. There are some parasites



VISCUM ALBUM.



CYNOMORIUM COCCINEUM.

of special organs called haustoria, which act as roots and enable it to draw crude sap, water, and salts from its host, and having green leaves it can absorb carbonic acid from the air, and elaborate food for its tissues. In the case of the dodder, again,

which are attached to the roots instead of the stems of their hosts — *e. g.*, yellow rattle, cow wheat, eyebright. The attachment by the haustoria is always remarkably inti-

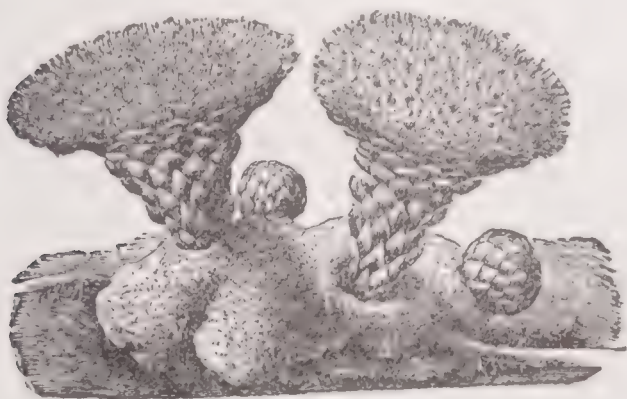
Parasitic Plants

mate; their tissues are always joined to the corresponding ones of the host, often in such a way that it is difficult to say to which plant they belong. The ovules of many parasites are rudimentary, the embryo is small and without chlorophyll; in cases of advanced parasitism it may even produce no leaves. There are parasitic



LORANTHUS EUROPÆS.

genera in many orders — *e. g.*, *Corallorhiza* in the *Orchideæ*, *Cuscuta* in *Convolvulaceæ*, *Orobanchæ* in *Labiatisfloræ*, *Monotropa* in *Pyrolaceæ*. The *Loranthaceæ*, of which is *Viscum* the mistletoe, the *Balanophoreæ*, and the *Santalaceæ* are families of doubtful affinity. Nearly all these parasites have a marked preference for a particular species of host, and they are all flowering plants. But there are many others; two whole classes, the bacteria and the fungi, are either

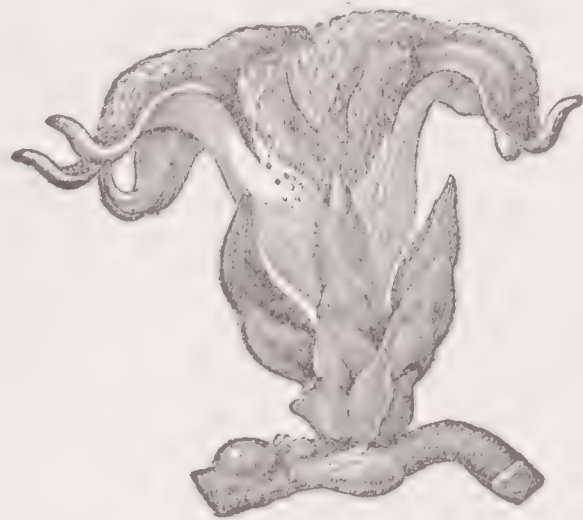


SCYBALIUM FUNGIFORME.

parasitic or, what is much the same thing, saprophytic — *i. e.*, dependent upon decaying organic matter for food. The bacteria have animals as their hosts, and cause in them many diseases, the species being often recognized by the disease. When they are saprophytic they cause fermentation and pu-

Parbuckle

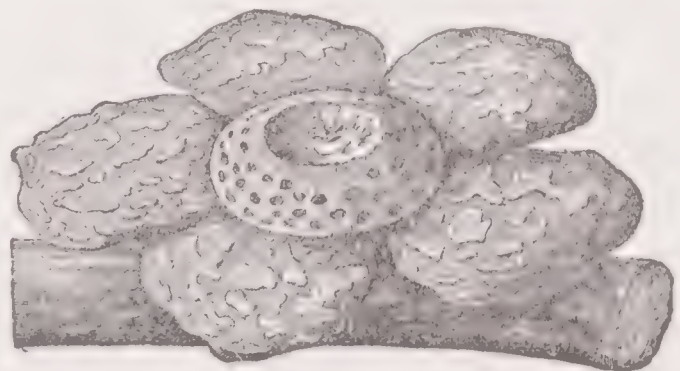
trefaction. The fungi are many of them a trouble in agriculture, causing corn, hop, and vine mildew, potato disease (see PLANTS, DISEASES OF), and also salmon disease; others, like the mushroom, are saprophytes. Allied to parasitism is symbiosis, a sort of mutually arranged parasitism for



BRUGMANSIA ZIPPLE.

the benefit of both parties; as in the case of the lichens, which consist of algæ and fungi in partnership.

But the most important and interesting of the vegetable parasites are those belonging to the schizomycetes or bacteria, whose study has assumed such prominence that



RAFFLESIA HARRELLI.

it is now almost an independent science. The relations of these organisms to their host are much more intimate than in the case of the larger parasites, and the problems presented by the disease associated with them are consequently much more difficult of solution; but in some cases the parasitic nature of these diseases has been completely established. Analogy makes it probable that some day all "specific febrile diseases" will have to be included in this group.

Parasol, a small umbrella or sunshade carried by ladies to shelter them from the rays of the sun.

Parbuckle, or **Parbuncle**, a double sling made of a single rope, for hoisting or lowering a cask or gun. Also, a means for raising or lowering. The bight of the rope

is placed around a post; the cask, spar, or gun lies in the double loop. This plan is adopted in Cunningham's mode of furling sails by rolling the yard. The latter lies in the bight of the chain, and is rolled as it is raised or lowered, the yard-arms resting in hoops slung from the lifts.

Parcæ. See FATES.

Parchment, the skin of a very young calf, sheep, or goat, dressed and prepared for writing on, etc. After removing the wool, the skin is steeped in lime and stretched in a wooden frame, and its face is scraped with a half-round knife. The skin, previously sprinkled with powdered chalk or slacked lime, is then rubbed and scraped with a knife, and it is then rubbed with a lambskin having the wool on to smooth the surface and raise a very fine nap; after which, if any greasy matter remains, it is again steeped in the lime pit for a few days. The grain surface is then removed with a knife and the skin pumiced, if necessary, to give it an equal thickness. Fine parchment is manufactured from the skins of young calves, kids, lambs; also from sheep, and goat skins. Extra fine, thin parchments are made from the skins of still-born lambs, kids, and calves. Coarse parchment for drumheads, etc., is made from calves', asses', and he-goats' skins.

Pardee, Ario, an American philanthropist; born in Chatham, N. Y., in 1810. One of the pioneers of the Pennsylvania anthracite region, he amassed several millions as a coal operator. His donations to Lafayette College amounted to \$500,000. He was active in various charitable movements. He died March 26, 1892.

Pardoe, Julia, an English author; born in Beverly, England, in 1806, published poems and a novel in her 15th year, and "Traits and Traditions of Portugal" in 1833. A visit to Constantinople in 1836 led to her "City of the Sultan," "Romance of the Harem," and "Beauties of the Bosphorus." She next visited Hungary, and wrote "The City of the Magyar," and a novel, "The Hungarian Castle" (1842). A series of works deal with French history — "Louis XIV. and the Court of France" (1847), "The Court and Reign of Francis I." (1849), "The Life of Mary de Medecis" (1852; new ed, 1891), "A Pilgrimage in Paris," and "Episodes of French History" (1859). Others of her numerous works are "The Confessions of a Pretty Woman," "Flies in Amber," "The Jealous Wife," "Reginald Lyle," etc. She died in 1862.

Pardon. The pardoning power is a prerogative of the sovereign power in a State, whether representative or monarchical. In the United States the pardoning power for offenses against the general government is vested in the President, the authority being delegated by the people through the medi-

um of the Constitution of the country. For offenses against the States the pardoning power is vested in the several governors, or as in a few cases, the governor and State legislature conjointly. The signification of pardon is to be differentiated from that of amnesty, which latter is the obliteration of a peculiar line of offenses arising on a special occasion, and does not bar prosecution for offenses other than those specified, while pardon includes all offenses of which a person may have up to date been guilty and absolves the offender entirely. In England a pardon must, till recently, have been issued under the great seal; but is now simply granted by warrant under the royal sign manual, countersigned by one of the principal secretaries of state. It may be absolute or conditional; that is, the sovereign may extend his mercy on what terms he pleases; and may annex to his bounty a condition either precedent or subsequent, on the performance whereof the validity of the pardon will depend; and this by the common law.

Pardon, George Frederick, an English miscellaneous writer; born in London in 1824. He wrote many handbooks of games, sports, and pastimes; several stories, as "Faces in the Fire" (1856); "Tales from the Operas" (1858); "Boldheart the Warrior" (1859); "Noble by Heritage" (1877); "Stories about Animals"; "Stories About Birds"; "Illustrious Women who have Distinguished Themselves for Virtue, Piety, and Benevolence" (1868). He died in 1884.

Paré, Ambroise, a French physician; born near Laval, in 1509, called the father of French surgery, and one of the greatest surgeons of modern times. He was professional adviser of four French sovereigns; and, though a Huguenot, he possessed the fullest confidence of Charles IX., and through his favor escaped the massacre of St. Bartholomew in 1590.

Parecis, a tribe or race of Indians in Brazil, formerly one of the most powerful in that region, but of whom only a few hundreds survive. They live in villages, farm their lands and are generally friendly to the whites.

Paregoric, the compound tincture of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing 2 grains each of opium and benzoic acid, and 1½ grains of camphor. This preparation is much used both by the profession and the public. In doses of from 30 to 60 drops it is an excellent remedy for the chronic winter cough of old people, the opium diminishing the bronchial secretion and the sensibility of the pulmonary mucous membrane, while the benzoic acid and oil of anise act as stimulating expectorants. It has also been found useful in chronic rheumatism,

and, especially in the case of children, to relieve slight pains in the stomach and bowels.

Pareira Root, or **Pareira-brava Root**, a dried root, generally said to be that of *Cissampelos pareira*. Hanbury, however, states that the original reputation of *P. brava* was founded on a different plant, viz., *Chondrodendron tomentosum*, and that the plant furnishing the pareira root is unknown. A decoction, an extract, and a liquid extract of pareira are used in catarrhal affections of the bladder, and in pyelitis. Its efficacy is doubted by some.

Pareja, Juan de, a Spanish painter, "the slave of Velasquez"; born of West Indian parents in Seville, Spain, in 1606. In early life he was employed in menial work in the studio of Velasquez, and by closely watching his methods attained considerable skill secretly. At the intercession of Philip IV. he obtained his freedom, but continued in the family of Velasquez till his death. His success was chiefly in portraits, but he also painted several large pictures closely imitative of the style of his master. He died in 1672.

Parella, in botany, *Lecanora parella*, a crustaceous lichen, and some other species more or less akin to it, furnishing, as it does, the dye called litmus.

Parenchyma, in anatomy and zoölogy, the soft tissue of organs; generally applied to that of glands. Applied to the proper substance of viscera, excluding connective tissue, blood vessels, and other accessory organs. In botany, cellular tissue; tissue in which the diameter of the cells is not excessive in any one direction in which the cells are angular. There is a rounded, a polyhedral, a muriform, a tubular, a branched, and a stellate parenchyma. Griffith and Henfrey believe that the only important divisions are into parenchyma proper, in which the cells are polygonal, merenchyma, collenchyma, and sterenchyma.

Parenis, or **Parenas**, a tribe of Indians now practically extinct, who lived in Venezuela, on the Orinoco. They belonged to the Arawak or Maypure linguistic stock.

Parent, a term of relationship applicable to those from whom we immediately receive our being. Parents, by the law of the land, as well as by the law of nature, are bound to educate, maintain, and defend their children, over whom they have a legal as well as a natural power; they likewise have interests in the profits of their children's labor, during their nonage, in case the children live with and are provided for by them; yet the parent has no interest in the real or personal estate of a child, otherwise than as his guardian. The laws relating to the mutual rights and duties of parents and children are a very important

part of every code, and have a very intimate connection with the state of society and with civil institutions.

Parenthesis, a sentence or part of a sentence inserted in the middle of another sentence, with the subject of which it is cognate, but from which it may be omitted without impairing the grammatical construction or the substantial meaning. It is commonly marked off by upright curved lines (), but frequently also by dashes — —.

Parentintims, a nomadic tribe of Indians of the Amazon valley. They subsist by hunting and fishing and by depredations on the plantations of other tribes. They are constantly at war with the Mundurucus.

Parepa-Rosa, Madame (EUPHROSYNE PAREPA DE BOYESKU), a British operatic singer; born in Edinburgh, May 7, 1836; made her début in Malta in 1855; first appeared in England in 1857 and in the United States in 1866. In 1867 she married Carl Rosa and they organized an opera company in which she was very successful. Her voice was a soprano of great power and compass and she was greatly admired in oratorio singing. She died in London, Jan. 21, 1874.

Pargeting, plaster work of various kinds, especially decorative plaster work in raised ornamental figures, extensively adopted in the 16th and 17th centuries for the internal and external decoration of houses. Groups of figures, caryatids, festoons of fruit and flowers, and emblematic figures abound. Ceilings were frequently laid out in geometrical figures, the sunken panels between the leading lines being filled with devices of various kinds, and frequently with figures indicative of the virtues or mental qualifications.

Parhelion. See HALO.

Paria, Gulf of, an inlet of the Atlantic on the N. E. coast of South America, between the island of Trinidad and mainland of Venezuela, inclosed on the N. by the Peninsula of Paria. It possesses good anchorage, and receives some arms of the Orinoco.

Pariah, in Southern India, one of that section of the community with which even the lowest recognized castes will not eat, though there are Hindus inferior even to the pariahs. The latter are Turanian, and originally constituted that section of the aborigines of the S. of India who submitted to the Aryan and other conquerors during the successive invasions of the land. Many pariahs are servants of Europeans, accompanying the regiments over the whole Madras presidency, hence they are more civilized than the castes above them; and a number of them have embraced Christianity.

Parian Chronicle, an inscription on some of the Arundelian marbles (*q. v.*), so called from having been kept in the island of Paros. It is a chronological account of the principal events in Grecian, and particularly in Athenian history, during a period of 1,318 years, from the reign of Cecrops, 1450 B.C., to the archonship of Diognatus, 264 B.C. Unfortunately the chronicle of the last 90 years was lost.

Parian Marble, a white, large-grained, and considerably translucent marble, called by the Greeks *lychintes*, from *lychnos* = light, because quarried by lamplight. It

vent estate, who, with certain exceptions, are entitled to payment of their debts in shares proportionate to the claims which they may have against the estate.

Paris, a town of Texas, county-seat of Lamar co., 100 miles N. E. of Dallas; on the Texas and Pacific, St. Louis and San Francisco, Texas Midland, and Gulf, Colorado, and Santa Fé railroads. Mary Connor College (undenominational), for women, is located here, and there is a good system of public schools. Six religious denominations are represented, owning eighteen buildings. Four banks had in 1907 deposits amounting

to \$3,629,847. The property valuation for 1907 was \$8,000,000. Paris is the center of an agricultural section particularly known for the production of cotton, and its wholesale and shipping interests are considerable. The cotton and corn marketed there in 1906 were valued at \$3,250,000. The city government is administered by a mayor and five aldermen elected by the city at large. All other officers are appointed by the mayor. Water works, fire department, and sewerage are under municipal control. Pop. (1900) 9,358; (1910) census, 11,629.

Paris (anciently, *Lutetia Parisiorum*), the capital of France and of the department of the Seine. The city lies in



PARIS: THE PANTHEON.

was the most celebrated statuary marble of antiquity, and was found in the island of Paros, also in Naxos and Tenos. The celebrated statues of the Venus de Medicis, the Venus Capitolini, etc., are made of this marble.

Parima, or **Parime Sierra**, a mountain range situated in the N. E. of Venezuela. In general it is composed of bare plateaus, and its highest peaks rise to a height of about 8,000 feet. The Essequibo, Orinoco, and Rio Branco have their rise in this range.

Pari Passu, with equal pace, steps, or progress. In law, a term signifying equally, in proportion; without undue preference; said especially of the creditors of an insol-

vent estate, who, with certain exceptions, are entitled to payment of their debts in shares proportionate to the claims which they may have against the estate.

the Seine valley surrounded by heights, those on the N. being Charonne La Villette, the Buttes-Chaumont, and Montmartre; those on the S., St. Geneviève, Montrouge, and the Butte-aux-Cailles. Through the valleys between these heights, the river runs from E. to W., inclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays which extend along the Seine on both sides, being built of solid masonry, protect the city from inundation and form excellent promenades. The river, which within the city is fully 530 feet in width, is crossed by numerous bridges, the more important being Pont Neuf, Pont des Arts, Pont du

Carrousel, Pont Royal, Pont de l'Alma, etc. The city is surrounded by a line of fortifications which measures 22 miles; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line

each of which sends a member to the municipal council. The council discuss and vote the budget of the city. At the head is the prefect of the Seine and the prefect of police. The water supply of the city is derived from the Seine and the Marne, from



CHURCH OF ST. AUGUSTIN.

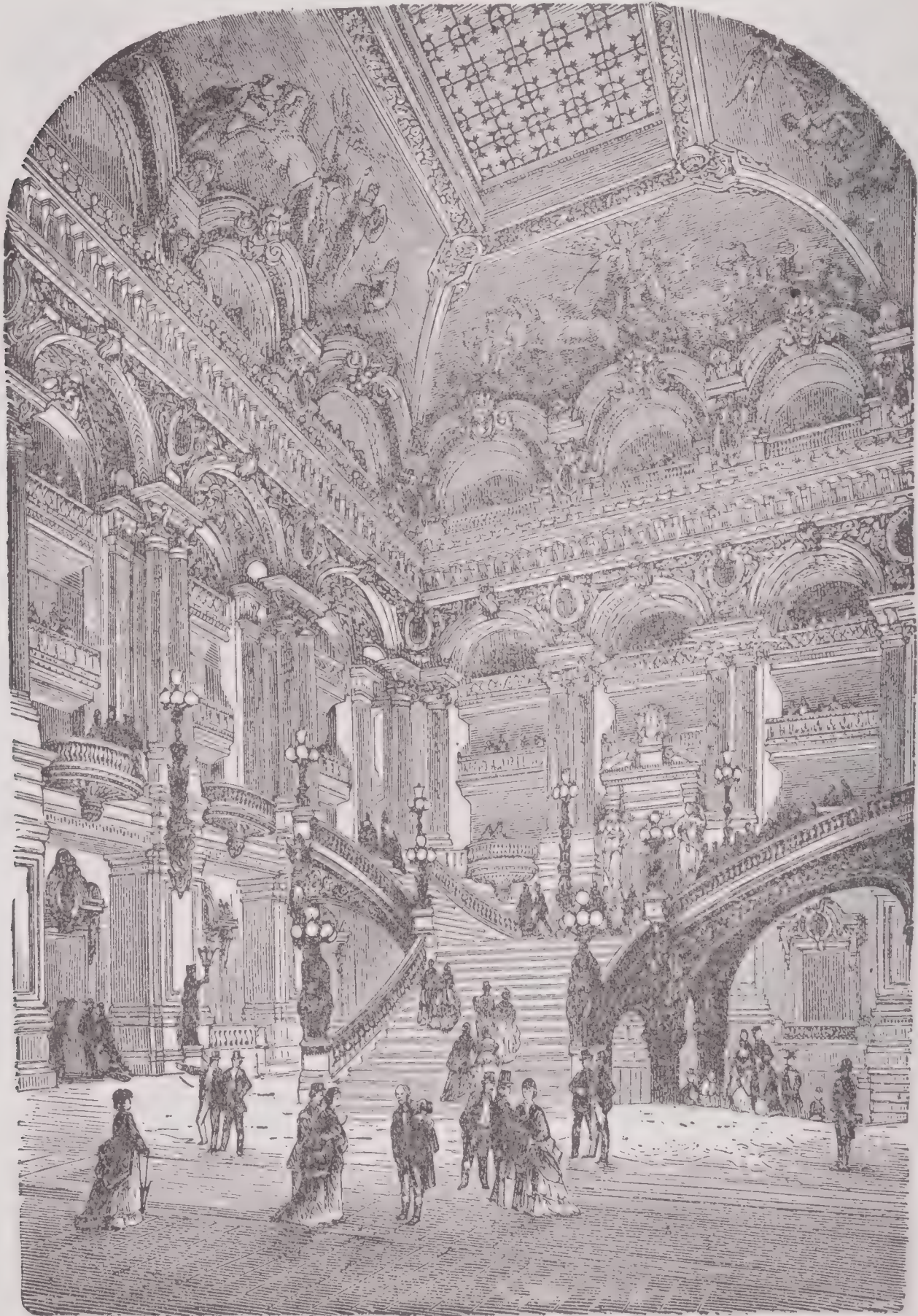
consists of 16 forts, the outer line of 18 forts, besides redoubts; the area thus inclosed measuring 430 square miles, with an encircling line of 77 miles. The climate of Paris is temperate and agreeable. The city is divided into 20 arrondissements, at the head of which is a *maire*. Each arrondissement is divided into four quarters,

the Ourcq canal, from artesian wells, and from springs.

Streets, Boulevards, Etc.—The houses of Paris are almost all built of white calcareous stone, and their general height is from five to six stories, arranged in separate tenements. Many of the modern street buildings have mansard roofs, and are high-

ly enriched in the Renaissance manner. In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well paved. What are known as "the

includes the Boulevards du Temple, St. Martin, St. Denis, des Italiens, Capuchins, Madeleine, etc., and its length of nearly 3 miles forms the most stirring part of the city. Here may be noted also the mag-



STAIRCASE OF THE GRAND OPERA HOUSE.

boulevards" include the interior, exterior, and military. That which is specifically called "The Boulevard" extends, in an irregular arc on the N. side of the Seine, from the Place de la Bastille in the E. to the Place de la Madeleine in the W. It

nificent triumphal arches of Porte St. Denis and Porte St. Martin, the former of which is 72 feet in height. On the S. side of the Seine the boulevards are neither so numerous nor so extensive, the best known being the Boulevard St. Germain, which extends

from Pont Sully to the Pont de la Concorde. The exterior boulevards are so named because they are outside the old city limits; and the military boulevards, still farther out, extend round the fortifications. After the boulevards mentioned the best streets are the Rue de Rivoli, Rue Castiglione, Rue de la Paix, Rue de la Chaussée d'Antin, the Rue des Pyramides, and 12 fine avenues radiating from the Place de l'Etoile. There are six passenger stations for the railways to the various parts of the country, and a railway around the city (the *ceinture*), by means of which interchange of traffic between the different lines is effected. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs, and an underground electric road.

Squares, Parks, Etc.—The most notable public squares or *places* are the Place de la Concorde, one of the largest and most elegant squares in Europe, surrounded by fine buildings and adorned by an Egyptian obelisk, fountains, and statues; Place de l'Etoile, in which is situated the Arc de Triomphe, a splendid structure, 152 feet in height; the Place Vendôme, with column to Napoleon I.; Place des Victoires, with equestrian statues of Louis XIV.; Place de la Bastille, with the Column of July; Place de la République, with colossal statue of the Republic; etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes, in which are the zoölogical gardens, hothouses, museums, laboratories, etc., which have made this scientific institution famous; the Buttes-Chaumont Gardens, in which an extensive old quarry has been turned to good account in enhancing the beauty of the situation; the Parc Monceaux; and the Champs Élysées, the latter being a favorite holiday resort of all classes. But the most extensive parks are outside the city. Of these the Bois de Boulogne, on the W., covers an area of 2,150 acres, gives an extensive view toward St. Cloud and Mont Valérien, comprises the race courses of Longchamps and Auteuil, and in it are situated lakes, an aquarium, conservatories, etc. The Bois de Vincennes, on the E., even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and having many important monuments. The Catacombs are ancient quarries which extend under a portion of the S. part of the city, and in them are deposited the bones removed from old cemeteries now built over.

Churches.—Of the churches of Paris the most celebrated is the cathedral of Notre Dame, situated on one of the islands of the Seine, called the île de la Cité. It is a vast cruciform structure, with a lofty W. front, flanked by two square towers, the walls sustained by many flying buttresses, and the E. end octagonal. The whole length of the church is 426 feet, its breadth 164 feet. The foundation of Notre Dame belongs to the 6th century; the present edifice dates from 1163; but was restored in 1845. The interior decorations are all modern. The church of La Madeleine, a modern structure in the style of a great Roman temple, entirely surrounded by massive Corinthian columns, stands on an elevated basement fronting the N. end of the Rue Royale; the church of St. Geneviève, built about the close of the 18th century, was after its completion set apart, under the title of the Panthéon, as the burying place of illus-



ARC DE TRIOMPHE.

trious Frenchmen; St. Eustache (1532-1637), a strange mixture of degenerate Gothic and Renaissance architecture; St. Germain l'Auxerrois, dating from the 15th and 16th centuries; St. Gervais; St. Roch; St. Sulpice; Notre Dame de Lorette; St. Vincent de Paul; etc. On the very summit of Montmartre is the church of the Sacred Heart, a vast structure in mediæval style, estimated to cost \$4,800,000. The Protestant churches are the Oratoire and Visitation, and chapels belonging to English, Scotch, and American denominations. There are also a Greek chapel and several synagogues.

Palaces and Public Buildings.—Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum which comprises splendid collections of sculpture, paintings, engravings, bronzes, pottery,

Egyptian and Assyrian antiquities, etc. (see LOUVRE); the palace of the Tuileries, the main front of which was destroyed in 1871 by the Communists, has since been restored, with the exception of its principal façade, the ruins of which have been removed and its site converted into a garden; the Palais du Luxembourg, on the S. side of the river, has very extensive gardens attached to it, and contains the Musée du Luxembourg, appropriated to the works of modern French artists; the Palais Royal is a famed resort; the Palais de l'Élysée, situated on the Rue St. Honoré, with a large garden, is

very rich example of Renaissance architecture. The Hôtel des Invalides, built in 1670, with a lofty dome, is now used as a retreat for disabled soldiers and is capable of accommodating 5,000. It contains the burial place of the first Napoleon. The Court House is an irregular mass of buildings occupying the greater part of the W. extremity of the Île de la Cité. Opposite the Court House is the Tribunal de Commerce, a quadrangular building inclosing a large court roofed with glass. The Mint (Hôtel des Monnaies) fronts the Quai Conti, on the S. side of the Seine, and con-

tains an immense collection of coins and medals. The other principal government buildings are the Treasury (Hôtel des Finances), in the Rue de Rivoli; the Record Office (Hôtel des Archives Nationales). The Exchange (La Bourse) was completed in 1826; it is in the form of a parallelogram, 212 feet by 126 feet, surrounded by a range of 66 columns. A distinctive feature are the extensive markets, among the most important of which are the Halles Centrales, where fish, poultry, butcher meat and garden produce are sold. A notable and unique structure is the Eiffel Tower, built in connection with the Paris Exhibition of 1889, and which is to have a permanent existence. It is a structure of iron lattice-work, 984 feet high, and having three stages or platforms. It is as yet the highest building in the world.

Education, Libraries, Etc.—The chief institu-



CHURCH OF NOTRE DAME.

now the residence of the President of the Republic; the Palais du Corps Législatif, or Chambre des Députés, is the building in which the Chamber of Deputies meets; the Palais de l'Industrie, built for the first international exhibition in 1855, is used for the annual *salon* of modern paintings, etc. The City Hall is situated in the Place de l'Hôtel de Ville, formerly Place de Grève, on the right bank of the river. It was destroyed by the Communists in 1871, but has now been reërected on the same site with even greater magnificence. It is a

tion of higher education is the academy of the Sorbonne, where are the university "faculties" (see FRANCE, section *Education*) of literature and science, while those of law and medicine are in separate buildings. There are, besides, numerous courses of lectures in science, philology, and philosophy delivered in the Collège de France, and courses of chemistry, natural history, etc., in the museum of the Jardin des Plantes. Among other Parisian schools are the secondary schools or lycées, the most important of which are Descartes (formerly

Paris

Louis le Grand), St. Louis, Corneille (formerly Collège Henri IV.), Charlemagne, Fontanes (formerly Condorcet), De Vanves; the École Polytechnique for military and civil engineers, etc; École des Beaux Arts; School of Oriental Languages; Conservatoire des Arts et Métiers, and the Conservatoire de Musique. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides 3,000,000 pamphlets, manuscript volumes, historical documents, etc. The other libraries are those of the Arsenal, St. Geneviève, Mazarin, De la Ville, De l'Institut, and D l'Université (the Sarbonne). There are also libraries subsidized by the municipality in all the arrondissements. Among museums, besides the Louvre and the Luxembourg, there may be noted the Musée d'Artillerie, in the Hôtel des Invalides, containing suits of ancient armor, arms, etc.; the Conservatoire des Arts et Métiers; the Trocadéro Palace, containing curiosities brought home by French travelers, casts from choice specimens of architecture, etc.; and the Cluny Museum, containing an extensive collection of the products of the art and artistic handicrafts of the Middle Ages. The chief of the learned societies is the Institute of France.

Hospitals.—There are many hospitals in Paris devoted to the gratuitous treatment of the indigent sick and injured; and also numerous establishments of a benevolent nature, such as the Hôtel de Invalides, or asylum for old soldiers, the lunatic asylum (Maison des Aliénés, Charenton), blind asylums; the deaf and dumb institute (Institution des Sourds-Muets); two hospitals at Vincennes for wounded and convalescent artisans; the *crèches*, in which infants are received for the day at a small charge; and the *ouvroirs*, in which aged people are supplied with work.

Theaters.—The theaters of Paris are exceedingly numerous. The most important are the Opera House, a gorgeous edifice of great size; the Opéra Comique, the Théâtre Français, the Odéon; the Théâtre de la Gaîté, for vaudevilles and melodramas; Théâtre des Folies Dramatiques, Théâtre du Chatlet, Théâtre du Vaudeville, Théâtre des Variétés, Théâtre de la Porte St. Martin, and the Théâtre de l'Ambigu Comique.

Industries and Trade.—The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paper hangings, saddlery, and other articles of leather, cabinet work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry, lace, embroidery, artificial flowers, combs, machines, scientific instruments, types, books, engrav-

Paris

ings, refined sugar, tobacco (a government monopoly), chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called *articles de Paris*. A large trade is carried on by the Seine both above and below Paris, as well as by canals.

Population.—According to approximate estimates the population of Paris was, in 1474, 150,000; under Henry II. (1547–1559), 210,000; in 1590, 200,000; under Louis XIV. (1643–1715), 492,600; in 1856 (before the annexation of the parts beyond the old city limits), 1,174,346; 1861 (after the annexation), 1,667,841; 1881, 2,269,023; (1896) 2,536,834; (1906) 2,763,393.

History.—The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Île de la Cité. It was a fortified town in A. D. 360., when the soldiers of Julian here summoned him to fill the imperial throne. In the beginning of the 5th century it suffered much from the Northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downward Paris has continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII., Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI. a course of prosperity again commenced. In the reign of Louis XIV. the Paris walls were levelled to the ground after having stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastille was left (till 1789), and in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the Revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III. is specially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. The most recent events in the history of Paris are the siege of the city by the Germans in the war of 1870–1871, and the subsequent siege carried on by the French national government in order to wrest the city from the hands of the Commune. Paris has been the scene of international exhibitions in

the years 1855, 1867, 1878, 1889, and 1890.

Paris, in Homeric mythology, the seducer of Helen, and the cause of the Trojan war; a younger son of Priam, King of Troy, by Hecuba, his queen. His mother, before the birth of Paris, having dreamed that she had brought forth a firebrand that would destroy both the palace and the city, consulted the oracle on the interpretation of her dream; when, to save the state from so dire a possibility, the priests advised the killing of the child as soon as born. As soon as Paris saw light, he was, accordingly, intrusted to a slave, who was bound to execute the royal will and priestly decree; and for that purpose carried the child to the side of Mount Ida, where,



THE JUDGMENT OF PARIS.

touched with pity, and revolting from the crime of infantine murder, the man left him; and where he was subsequently found by some shepherds, taken home, and reared as one of their own children. As Paris grew in frame and years, he showed such evidences of nobility of soul and heroic daring, especially in guarding the flocks under his care from all depredations both of robbers and wild beasts, as to obtain the title of "The Defender," or Alexander. At the marriage of Peleus, King of Thessaly, and Thetis, the goddess of Discord—out of envy at being left out of the list of invited guests—secretly entered the nuptial hall

and flung down a golden apple, on which was inscribed "The Prize of the Fairest." All the females claimed the apple as their own; and the angry feeling was only partially appeased by appointing an umpire, and allowing Minerva, Juno, and Venus to stand as candidates before the judge. So general had the reputation of the shepherd Paris become that he was unanimously selected for that responsible office, and being seated with the apple in his hands, commanded the three beauties to appear before him with all their charms unveiled, that he might fairly judge to whom the prize should be awarded. His decision finally fell to Venus. This judgment of Paris so enraged Minerva and Juno that they vowed eternal enmity against both Paris and his family. Priam, having been subsequently informed of the preservation of his son, and finding him so noble in appearance and heroic in his bearing, at once acknowledged him as his son, and forgetting the gloomy auguries attending his birth, freely admitted him to his court and his fatherly love.

Some time after his restoration his father dispatched him to Greece on some political mission, when, remembering the promise made to him by Venus, that he should possess the most beautiful woman in the world for his wife, and having heard the report of the surpassing attractions of the Spartan Helen, he steered his fleet for Lacedæmon, and visiting the court of Menelaus, King of Sparta, was there most hospitably entertained by the unsuspecting Menelaus; and where he found the lovely Helen, who had become the wife of the Spartan king, far exceeded all the accounts he had received of her fascination and beauty. In the meantime, the monarch being called away on some special business to the island of Crete, Paris, who had found means to make himself agreeable to Helen, persuaded her to embrace the opportunity of her husband's absence to quit her country and elope with him to Troy. Helen accordingly fled with Paris, and was received with welcome and open arms by Priam, and installed with all honor in Ilium.

This violation of good faith, and the breach of hospitality committed by the Trojan, so enraged the Spartan king, on his return from Crete, that he called upon the other states of Greece to make a common cause of the indignity he had suffered, and declare a war of extermination against perfidious Troy. This summons was promptly answered by every state and kingdom in Greece, and the 10 years' siege of

Troy was the consequence. Paris, abashed by the injury he had inflicted on Menelaus, avoided on all occasions meeting the Spartan king in the frequent battles that ensued, and left the field whenever Menelaus appeared in front. Once, however, according to Homer, they met, when Paris would have fallen but for the interposition of Venus, who saved him from the wrathful vengeance of the outraged king. It was a javelin, hurled by the arm of Paris, that found the vulnerable spot in Achilles, and brought that hero prostrate to the plain. The death of Paris is variously told; all, however, that is known of his end is, that he fell at or previous to the sack of Troy, and that Helen returned, as a prize, with her husband to Greece.

Paris, Gaston Bruno Paulin, a French romance philologist; born in Avenay, Aug. 9, 1839. He was Professor of the French Language and Literature at the Collège de France, and did much to arouse interest in the study of Romance philology. "A Poetical History of Charlemagne" (1866), "Poetry of the Middle Ages" (1885), and "French Mediæval Literature" (1888), were his most important publications. He was a member of German, Austrian, and Italian academies, and an officer of the Legion of Honor. He died March 6, 1903.

Paris, Louis Albert Philippe, d'Orans, Count of. See ORLEANS.

Paris, Matthew, an English historian. was a Benedictine monk of St. Alban's, and is known from 1245, to the year of his death, 1259. He was a man of the highest character, and distinguished as a musician, poet, orator, theologian, painter, and architect. His practical talents were turned to the reformation of monastic discipline, on which account he was sent to Norway by the Pope. His principal work, first published in 1571, extends over English history from the reign of William the Conqueror, to his own times.

Paris, Declaration of. In 1856 the representatives of the Powers agreed to four points in international law — viz.: (1) Privateering is abolished; (2) the neutral flag covers enemies' goods, excepting contraband of war; (3) neutral goods, with the same exception, are not liable to be seized even under an enemy's flag; (4) blockades, in order to be binding, must be effective. The United States refused to accept the first point, because the European Powers declined to affirm that hereafter all private property should be exempted from capture by ships of war. See NEUTRALITY.

Paris, The, an American ship which was lost on Manacle rocks on the Cornwall coast, May 21, 1899. She had a crew of 350, with 481 passengers, making the total number aboard 831, all of whom were saved.

The boat could not be detached from the rocks on which she struck, though all efforts were made to release her, and she finally went to pieces there. The history of the "Paris" was an eventful one. She was built at Glasgow in 1889; was 525 feet in length and 63.2 feet in breadth; tonnage 10,800. There was a double bottom throughout, and 15 water-tight compartments. She had twin screws propelled by separate sets of engines, each set being capable of driving the boat at 15 knots an hour. The "Paris" was built for an auxiliary cruiser of the Royal Naval Reserve, and the promenade deck was especially strengthened for that purpose. She was arranged to carry 14 guns. When fitted up for a passenger vessel her interior resembled that of a handsome hotel, with finishings of natural wood and decorated by artists. There was a large library, a pipe organ, piano, and valuable furniture. The "City of Paris," as she was named, was a steamer of the Inman line up to 1893, when she became an American ship. It was while still an Inman liner that she was wrecked by the breaking of her machinery off the coast of Ireland in March, 1890. She had 1,060 persons on board, but no one was lost. During the American-Spanish War the "Paris" became a United States cruiser under the name of the "Yale." Soon after her departure from Southampton to New York, to make ready for war, it was rumored that she had been captured by fast Spanish cruisers from Cadiz and Corunna, but she reached New York in safety. She was fitted up with guns and sailed for Southern waters under charge of Capt. J. S. Wise, U. S. N. Captain Watkins staid with his ship as navigating officer with the rank of lieutenant-commander. The "Paris" was the first American warship in Porto Rico waters, being off San Juan at midday of May 8, 1898. She captured the "Rita," a blockade runner. She was used as a transport after doing efficient cruising service, and was returned to the American line, on Sept. 2, resuming her place in the merchant marine.

Paris, Treaties of. Of the numerous treaties bearing this designation a few only of the most important can be mentioned here. On Feb. 10, 1763, a treaty of peace was signed between France, Spain, Portugal, and England in which Canada was ceded to Great Britain. On Feb. 6, 1778, was signed that between France and the United States, in which the independence of the latter country was recognized. A treaty was signed between Napoleon I. and the allies, ratified April 11, 1814, by which Napoleon was deposed and banished to Elba. The treaty for the conclusion of peace between Russia on the one hand, and France,

Paris

Sardinia, Austria, Turkey, and Great Britain on the other, at the end of the Crimean War, was ratified March 30, 1856. The treaty of peace with Germany, at the end of the Franco-German War, was concluded May 10, 1871, and modified by the convention of Oct. 12, 1871, by which France lost a great part of the Rhine provinces. The treaty between Spain and the United States at the end of the American-Spanish War was concluded Dec. 10, 1898; was ratified by the United States Senate, Feb. 6, 1899; was signed by President McKinley, Feb. 10, 1899; and by the Queen Regent of Spain, March 17, 1899.

Paris, University of, a notable French institution that came into existence in the beginning of the 13th century, and was long the most famous center of learning in Europe. It was suppressed by a decree of the Convention of 1793.

Paris Award. See **BERING SEA**.

Paris Basin, in geology, a series of Tertiary deposits lying in a cavity or depression in the Cretaceous rocks under and around Paris. The Tertiaries of the Paris basin are many of them richly fossiliferous. Sometimes, as by M. Hébert, the term Paris is made to include also the Chalk in which the Tertiaries lie.

Paris Blue, a bright blue obtained by exposing a mixture of rosaniline, 10 times its weight of aniline, and some benzoic acid to a temperature of 180° C.

Paris Green, a poisonous green powder composed of a mixture of double salts of the acetate and the arsenite of copper; used to destroy the potato bug, or Colorado beetle.

Paris Gypsum, in geology, gypsum belonging to the Lacustrine gypseous series of Montmartre. It is a granular crystalline rock, and, together with the associated marls, contains land and fluviatile shells and the skeletons of birds and mammals. Of the last about 50 species have been found, nearly four-fifths of them perissodactyle Ungulata. It was from this formation that Cuvier obtained the bones the study of which did so much to found the science of comparative anatomy.

Parish, a district marked out as that belonging to one church, and whose spiritual wants are to be under the particular charge of its own minister; or, to give the sense which the word often has in acts of Parliament, a district having its own offices for the legal care of the poor, etc. Parishes have existed in England for more than 1,000 years. They were originally ecclesiastical divisions, but now, in England especially, a parish is an important sub-division of the country for purposes of local self government, most of the local rates and taxes

Park

being confined within that area, and to a certain extent self imposed. In Scotland the division into parishes was complete about the beginning of the 13th century, and this division is also recognized for certain civil purposes as well as for purposes purely ecclesiastical. In the United States a parish is a body of people united in one Church organization. In Louisiana the counties are called parishes.

Parish School, formerly the public school of a parish in Scotland. The foundation of parish schools in Scotland is due to John Knox. The establishment of such schools was authorized by act of Parliament in 1615; and by act of 1696 it was required that where no parochial school had been before established the heritors were to provide a schoolhouse and pay a certain sum for the support of the schoolmaster. If the heritors failed in this duty the presbytery might apply to the commissioners of supply to have it effected. The sufficiency and qualification of the parochial schoolmasters, as well as their conduct after their admission, were to be judged by the presbytery. By a statute of George III., by which the parish schools were to be regulated after 1803, the choice of the schoolmaster was vested in the minister and heritors. An act passed in 1861 made important alterations and modifications, and since the Education Act of 1872 parish schools in their distinctive character now exist no longer, being transferred to the control of the school boards.

Park, in a legal sense, a large piece of ground inclosed and privileged for wild beasts of chase, by the monarch's grant, or by prescription. The only distinction between a chace and a park was, that the latter was inclosed, whereas a chace was always open. The term now commonly means a considerable piece of ornamental ground connected with a gentleman's residence; or an inclosed piece of public ground devoted to recreation, and generally in or near a large town. See **NATIONAL PARKS**.

Park, Andrew, a Scotch poet; born in Renfrew, Scotland, March 7, 1807. After an Oriental tour he published "Egypt and the East" (1856). His poems are: "The Vision of Mankind"; "The Bridegroom and the Bride" (1834); "Silent Love," a graceful poem (1843); "Veritas" (1849), a poem of an autobiographical character. He died in Glasgow, Dec. 27, 1863.

Park, John, a Scotch poet; born in Greenock, Scotland, Jan. 14, 1804. He wrote many songs which have become popular favorites, among them "O gin I were where Gadie rins," and "The Miller's Daughter." His songs were not published till after his death; then also was published a volume of his "Lectures and Ser-

Park

mons" (1865). He died in St. Andrews, April 8, 1865.

Park, Mungo, a celebrated Scotch traveler; born in Fowlshiels, Scotland; Sept. 10, 1771. He was sent to Africa under the auspices of the African Association, and explored the Gambia and Upper Niger, publishing on his return the well-known "Travels in the Interior of Africa" (1799). On his second expedition, which was equipped by the British government, he descended the Niger some 1,500 miles; and after losing the majority of his men from fever, was treacherously murdered by natives, in 1806.

Park, Roswell, an American physician; born in Pomfret, Conn., May 4, 1852; was graduated at Racine College and at the Northwestern University Medical School in 1876. He held professorships at the Northwestern University, Rush Medical College, Chicago; University of Buffalo, etc.; and was director of the New York State Pathological Laboratory in Buffalo. He wrote various works on surgery, and attended President McKinley when he was shot.

Park, Roswell, an American miscellaneous writer; born in Lebanon, Conn., in 1807. He published: "Selections of Juvenile and Miscellaneous Poems" (1836); "Sketch of the History of West Point" (1840); "Pantology, or Systematic Survey of Human Knowledge" (1841); and "Jerusalem, and Other Poems" (1857). He died in Chicago, Ill., in 1869.

Park College, a coeducational institution in Parkville, Mo.; founded in 1875; under the auspices of the Presbyterian Church; has grounds and buildings valued at over \$450,000; endowment, about \$350,000; ordinary income, \$25,000; volumes in the library, 17,000; average faculty, 25; average students, 480; graduates, over 700.

Parke, John Grubb, an American military officer; born in Chester co., Pa., Sept. 22, 1827; was graduated at the United States Military Academy, July 1, 1849, and was assigned to the Corps of Engineers as brevet 2d lieutenant. From 1857 till the opening of the Civil War, he was chief astronomer and surveyor in the demarkation of the N. W. boundary line between the United States and British America. He served through the Civil War; was promoted Major-General of volunteers in 1862; brevetted Major-General, U. S. A., in 1865; and retired July 2, 1889. From 1887 till his retirement he was superintendent of the Military Academy. He died in Washington, D. C., Dec. 16, 1900.

Parker, Alton Brooks, an American jurist; born in Cortland, N. Y., May 14, 1852; was educated in public schools and at the Albany Law School; surrogate of Ulster county in 1877-1885; appointed a

Parker

judge of the Supreme Court of New York in 1885; member of the Court of Appeals of New York, second division, in 1889-1893; member of the General Term in 1893-1896; member of the Appellate Division in 1896-1897; and became chief judge of the Court of Appeals of New York on Jan. 1, 1898. He was the unsuccessful Democratic candidate for President in 1904.

Parker, Sir Gilbert, Canadian novelist; born, Ontario, 1861. Among his works are: "Pierre and His People"; "Tales of the Far North"; "An Adventurer of the North"; "A Romany of the Snows"; "A Lover's Diary" (1894); "The Trail of the Sword" (1894); "When Valmond Came to Pontiac"; "The Seats of the Mighty"; "The Right of Way"; etc.

Parker, Sir Hyde, a British naval officer; born in 1730, of a Devonshire family distinguished both before and after him in the naval service of the country, served in the American war and in the West Indies, and in 1801 was appointed to the chief command of the fleet which was sent to the Baltic to act against the armed coalition of the three Northern States of Russia, Sweden, and Denmark. He had no share in the battle of Copenhagen, in which Nelson engaged contrary to his orders; but by his appearance before Carlskrona he compelled the neutrality of Sweden; and he was on the point of sailing for Cronstadt when the news of the Emperor Paul's death put an end to hostilities. He died in 1807.

Parker, James, an American lawyer; born in Newark, O., in 1832; was educated at the United States Naval Academy; served on board the "Saratoga" and the "Yorktown"; studied law in Cincinnati, O., and was admitted to the bar in 1857. He served with distinction in the Union navy during the Civil War, and in 1866 resigned his commission to take up the practice of admiralty law. He was one of the crew which, at the Washington Centennial celebration, rowed the barge containing President Harrison, from the "Despatch" to the foot of Wall street, New York city. In 1901 he was counsel for Rear-Admiral Schley in the Schley Court of Inquiry.

Parker, John Henry, an English archæologist; born in London in 1806. He superintended many excavations in Rome, and was the author of "The Archæology of Rome" (1874-1884), an important work on the walls, aqueducts, tombs, etc., of the Eternal City. His other publications are: a "Glossary of Architecture" (1836), an important aid to the revival of Gothic art; "Introduction to the Study of Gothic Architecture" (1849). He died in 1884.

Parker, Joseph, an English preacher and orator; born April 9, 1830, in Hexham, Northumberland; was educated privately and at University College, London; elected

Parker

Chairman of the Congregational Union, 1884;; minister of the City Temple, London, from 1869; author of "Ecce Deus," "The Paraclete," "The People's Bible," a gigantic undertaking in 25 volumes, and "Weaver Stephens," a novel. In the autumn of 1887 Dr. Parker visited the United States, and delivered a memorial eulogy of Henry Ward Beecher in the Academy of Music, Brooklyn. He died Nov. 28, 1902.

Parker, Martin, a noted English balladist; the dates of his birth and death are unknown, but he died probably in 1656. Among his ballads are: "When the King Enjoies his Own Again"; "The King and a Poore Northerne Man"; "Sailors for my Money"; "John and Joan; or, A Mad Couple Well Met."

Parker, Matthew, Archbishop of Canterbury; born in Norwich in 1504; was educated at Cambridge, and after having been licensed to preach was appointed dean of Stoke College in Suffolk. He was also made a king's chaplain and a canon of Ely. In 1544 he was appointed master of Corpus Christi College, Cambridge, and elected vice-chancellor of that university the following year. When Queen Mary succeeded to the throne Parker was deprived of his offices, and remained in concealment till the accession of Elizabeth in 1558. By royal command he was summoned to Lambeth, and appointed Archbishop of Canterbury. It was while he held this office that he had what is known as the Bishop's Bible translated from the text of Cranmer, and published at his own expense. He was the founder of the Antiquarian Society, a collector of MSS., which he presented to his college, and editor of the "Chronicles of Walsingham," "Matthew Paris," and "Roger of Wendover." He died in 1575.

Parker, Theodore, an American theologian; born in Lexington, Mass., in 1810. He entered Harvard College in 1830, continuing, how-



THEODORE PARKER.

ever, for a time to work on his father's farm, and afterward teaching school at Boston. In 1834 he entered the Theological School, the professors at which belonged to the then rising liberal school. After laborious and successful studies, he was chosen, in 1837, minister of a Unitarian congregation at West Roxbury, his marriage having taken place just previously. He had there leis-

Parkersburg

ure for study, and read extensively, enjoying the society of Dr. Channing. His views of Christianity had diverged considerably from the standard of his sect, and great excitement was occasioned by his sermon "On the Transient and Permanent in Christianity," preached in 1841. Wearied with the bitterness and opposition of his adversaries, he visited Europe in 1843. The prejudice against him led to his quitting West Roxbury, and settling at Boston in 1846, as minister of the Twenty-eighth Congregational Society. In the following year he became joint-editor with Emerson and Cabot of the "Massachusetts Quarterly Review." He distinguished himself as the fearless opponent of the Fugitive Slave Law and sheltered slaves in his own house. Notwithstanding his failing health he was very active as a public lecturer on various political and social topics, and was the correspondent of many eminent men; among them, Charles Sumner, Buckle, Professor Gervinus, etc. Early in 1859 he was compelled to relinquish his duties and seek health in France and Italy. His earliest published works was the "Discourse of Matters Pertaining to Religion," which appeared in 1847. In this work alone he exhibits his fundamental principles in a systematic form. It has passed through several editions, and has been widely read in Europe as well as in America, and is one of the most important and interesting of recent contributions to religious philosophy. Among his other works, of which a collected edition has been published by Miss Cobbe, are, "Critical and Miscellaneous Writings"; "Theism, Atheism, and the Popular Theology"; "Discourses of Politics"; "Experiences as a Minister," etc. He died in Florence in 1860.

Parker, Willard, an American physician and surgeon; born in New Hampshire, in 1800; Professor of Surgery in the New York College of Physicians and Surgeons, 1839-1869; and subsequently Professor of Chemical Surgery in the same institution; he made many important discoveries in practical surgery. He died in 1884.

Parker, Sir William, a British naval officer; born in 1781; entered the naval service, greatly distinguished himself by the capture of the "Belle-Poule," a French frigate, and in 1809 made himself master of the citadel of Ferrol. In 1841 he took command of the fleet operating against China; forced the entrance of the Yang-tse-kiang, and appeared before Nanking, where terms of peace were agreed upon. In 1863 he was made admiral of the fleet. He died in 1866.

Parkersburg, a city and county-seat of Wood co., W. Va., on the Ohio river at the mouth of the Little Kanawha, and on the Ohio River, Baltimore and Ohio Southwestern, and the Baltimore and Ohio railroads;

96 miles S. W. of Wheeling. The Ohio river is crossed here by a railroad bridge constructed in 1869-1871 at a cost of \$1,000,000. It is $1\frac{1}{3}$ miles long and has six spans. Here are waterworks, a high school, Academy of the Visitation, a seminary, United States government building, electric light and street railroad plants, National and State banks, and daily and weekly newspapers. Its manufactories include lumber mills, barrel factories, machine shops, iron foundries, veneer and panel works, furniture factories, and an oil refinery. The assessed property valuation is over \$6,000,000. Pop. (1900) 11,703; (1910) 17,842.

Parkes, Sir Henry, an Australian statesman; born in Stoneleigh, Warwickshire, England, in 1815, emigrated to New South Wales in 1839, and at Sydney became eminent as a journalist, editing "The Empire" from 1849 to 1856. A member of the colonial parliament in 1854, he held various government offices and became prime minister in 1872. He was several times head of the ministry, and was identified with the promotion of free trade. He was the representative of New South Wales at the Colonial conference in London in 1887, and in 1891 was president of the council for arranging a federal union of the Australian colonies. He died in Sydney, New South Wales, before seeing the fruition of his labors, April 27, 1896.

Parkhurst, Charles Henry, an American clergyman and reformer; born in Framingham, Mass., April 17, 1842. He was graduated at Amherst College in 1866; studied theology in Germany. After 1880 he was pastor of the Madison Square Presbyterian Church. In 1891, as president of the Society for the Prevention of Crime, he began his attack on the police department of New York city, and was prominent in the Lexow investigation which followed. His writings include: "The Blind Man's Creed" (1883); "Three Gates on a Side" (1891); "Our Fight with Tammany" (1895); etc.

Parkman, Francis, an American historian; born in Boston, Mass., Sept. 16, 1823; was graduated at Harvard in 1844; studied law for two years; then traveled in Europe; and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman worked his way to recognition as a historical writer on the period of rise and fall of the French dominion in America. He paid many visits to France to examine archives. His books are "The California and Oregon Trail" (1849); "The Conspiracy of Pontiac" (1851); "Pioneers of France in the New World" (1865); "The Book of Roses" (1866); "Jesuits in North America" (1867); "Discovery of the Great West"

(1869); "The Old Régime in Canada" (1874); "Count Frontenac and New France under Louis XIV." (1877); and "Montcalm and Wolfe" (1884). He died in Boston, Mass., Nov. 8, 1893.

Parley, Peter. See GOODRICH, S. G.

Parliament. Blackstone says that the first use of the French word *parlement*, to signify a General Assembly of the State, was under Louis VII. of France about the middle of the 12th century. With this view Littré essentially agrees.

The British Parliament.—The legislature of Great Britain and Ireland consists of the sovereign and the Houses of Lords and Commons. It arose long prior to the union of the kingdoms as the English Parliament. The first use of the word parliament in the statutes of England is in the preamble to the Statute of Westminster, A. D. 1272. The germ of the institution existed, however, long before the name arose. Each of the kingdoms of the Saxon heptarchy, or octarchy, seems to have had its wittenagemote, or meeting of wise men, which, on the union of the several kingdoms, became united into one great assembly or council. In Edward the Confessor's law *de Opibus*, a 10th is confirmed to the Church by the king, the barons, and the people. The laws and charters of the early Norman kings mention only abbots, barons, etc. In 1176 there was a council of bishops, earls, barons, knights and men. Writs, 1266, are still extant summoning knights, citizens, and burgesses to Parliament. The statute 2 Edward II. (1322) recognizes Parliament as having for some time existed, and with a constitution essentially the same as now. The powers of Parliament are very great. Not merely can it destroy any ministry, it can alter, and has in fact altered, the succession to the throne. At the Reformation it transferred property enjoyed by the Church of Rome and altered the National religion, endowing Protestantism with money given for Roman Catholic purposes. Parliament is called together by the sovereign, who appoints the time and place of meeting, and opens the proceedings by the delivery of a speech, either personally or by deputy. Each house can adjourn, but neither can be prorogued except by the sovereign. Each judges of its own privileges. Members of both houses are free from arrest or imprisonment on civil actions, but their property can be seized for debt. No quorum is needed for the transaction of business in the Upper House; 40 is the quorum in the Lower.

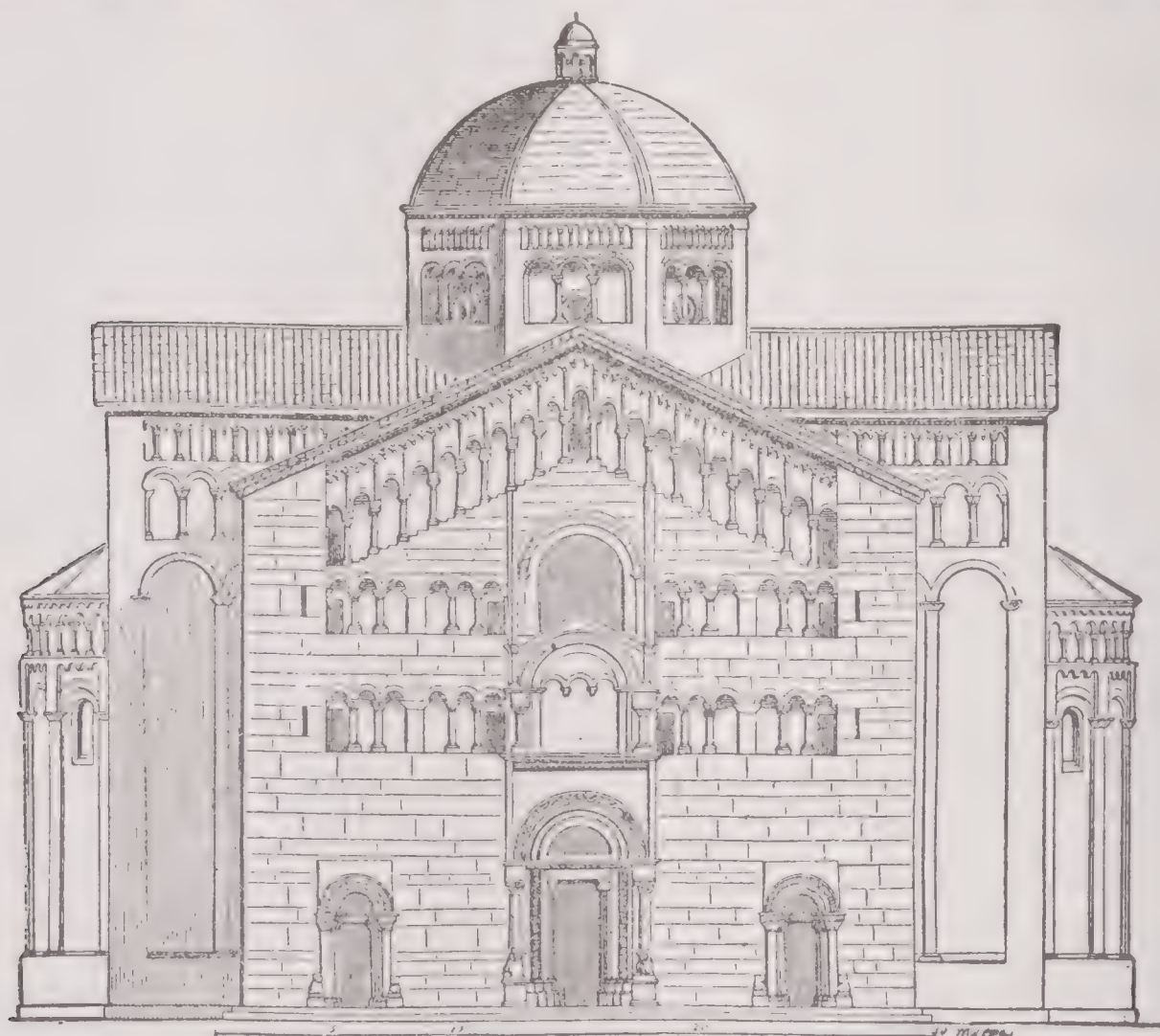
French Parliament.—A parliament arising about 987. It met at different places. In 1190 Philip Augustus instituted the Parliament of Paris. In 1302 it was divided into three chambers. It was suppressed in 1771, revived in 1774, demanded a meeting

of the States-General in 1787, and was superseded by the National Assembly Nov. 3, 1789. A French parliament still exists, but not the name.

Irish Parliament.—A parliament held in Ireland when it was an independent country. In 1295 writs for knights of the shires were issued. It met for the last time on Aug. 2, 1800, the union with Great Britain having terminated its existence.

Scotch Parliament.—A parliament held in Scotland when it was an independent country. It has been traced back to a council held at Scone under the auspices of John Balliol, in 1292. There was but a

of goats. Minerals, iron, copper, salt, etc. Manufactures, silk, linen, and cotton goods, paper, glass, gunpowder, brass etc. Capital, Parma. During the decline of the Roman empire, Parma became a part of the kingdom of Lombardy. It was taken by Charlemagne, and transferred to the papal see in 774. In 1543 Paul III. erected Parma and Piacenza into a duchy, which he bestowed upon the Farnese family, whose line became extinct in 1731. The treaty of Aix-la-Chapelle, in 1748, gave possession of Parma to Philip, son of Philip V. and Elizabeth Farnese. In 1815 Parma, Piacenza, and Guastala were formed into a duchy,



PARMA: FAÇADE OF THE CATHEDRAL.

single house, consisting of lords temporal and spiritual, occasionally with burgesses. Having passed the Act of Union with England on Jan. 16, 1707, its last meeting took place on April 22, of that year.

In English Law.—An assembly of the members of the Middle and Inner Temple to consult on the affairs of the society.

Parma, a province and former duchy of Northern Italy; having N. Lombardy, E. Modena, S. and W. Tuscany; area, 1,250 square miles. The surface is diversified, and the soil fertile in the plains. The climate is healthy except in the low lying districts along the rivers Po, Trebbia, and Enza. Products, maize, wheat, tobacco, hemp, and fruits. Numerous cattle are also reared; and it is noted for its cheese from the milk

and bestowed upon Maria Louisa, wife of Napoleon I., with reversion after death to Ferdinand Charles, Duke of Lucca, the son of Maria Louisa of Spain, and the rightful heir. A revolution occurred in 1859, on which Marie Therese de Bourbon, widow of Charles III., and regent for her infant son, left the country, and Parma was annexed to the kingdom of Italy in 1860. Pop. (1909) 299,661.

Parma, a fortified city, capital of the above province, 72 miles S. E. of Milan. It has a fine Gothic cathedral, and the ducal palace, which contains a library of 90,000 volumes, and a museum of antiquities. Parma has also a public library of 34,000 volumes. Manufactures, silk cotton, and

woolen goods, lace, cutlery, glass, and musical instruments. Pop. (1901) 49,340.

Parmesan Cheese, a cheese made of skimmed milk in the neighborhood of Parma by a peculiar process, flavored with saffron, and celebrated for its keeping qualities. Indeed, it becomes so hard as to require to be grated when used.

Parmigiano, or **Parmigianino**, the nickname of GIROLAMO FRANCESCO MARIA MAZZOLA, an Italian painter of the Lombard school, and the most distinguished of those who followed the style of Correggio; born in Parma, Jan. 11, 1504. He began to paint when little more than 14 years of age. In 1523 he went to Rome, and was favorably noticed and employed by Clement VII. When that city was stormed by the imperialists under Constable Bourbon in 1527 Parmigiano sat calmly at work on his picture of "The Vision of St. Jerome" (now in the National Gallery, London), and was protected from the soldiers who burst in on him by their leader. After this event he left Rome for Bologna, where he painted various works, including a celebrated altarpiece, the "Madonna and Child," and returned to Parma in 1531. Having engaged to execute a series of frescoes in the Church of St. Maria Steccata, and having got payment in advance, he delayed so long with the work that he was thrown into prison for breach of contract, and on being released fled to Casal Maggiore, in the territory of Cremona, where he died on Aug. 24, 1540. His best-known picture is "Cupid Shaping a Bow"; he painted portraits too, as of Charles V., Amerigo Vespucci and himself.

Parnahyba, a river of Brazil, rises in the Serra Mangabeiras, about lat. 9° S., and throughout its course (650 miles) forms the boundary between the States of Maranhao and Piauhy. It enters the Atlantic by six mouths. The stream is swift, but navigable by boats for nearly 350 miles. On the E. bank, 14 miles from its mouth, is the unhealthy town of Parnahyba, with a considerable trade.

Parnassus, a famous mountain of Greece, government of Phocis, N. W. of Mount Helicon. It has three peaks, the highest of which reaches an elevation of 8,068 feet. On the W. side lay Delphi, the seat of the famous oracle, and the fountain of Castalia. The highest peak was dedicated to Bacchus, and was the scene of the orgies of his worship. The rest of the mountain was sacred to Apollo and the Muses; hence, poets were said "to climb Parnassus."

Parnell, Charles Stewart, an Irish statesman; born at his father's estate of Avondale, Wicklow co., Ireland, in 1846, connected on his father's side with a family that originally belonged to Congleton,

Cheshire, and whose members included Parnell the poet, and Sir John Parnell, chancellor of the exchequer in Grattan's Parliament; while his mother was the daughter of Admiral Stewart of the United States navy. He was educated at Magdalen College, Cambridge; became member of Parliament for Meath in 1875; organized the "active" Home Rule Party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly formed Land League, was an active member of it, and was chosen president of the organization. In 1880 he was returned for the City of Cork, and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes Act and the Land Act; was arrested (Oct. 13), under the terms of the former, along with other members of his party; and was lodged in Kilmainham jail, from whence he was not released till the following May. In 1883 he was the recipient of a large money testimonial (chiefly collected in America), and in this year was active in organizing the newly formed National League. At the general election of 1885 he was reelected for Cork, and next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants that was rejected. In 1887 he and other members of his party were accused by the "Times" of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge a commission of three judges was appointed by the government in 1888, with the result that, after a great deal of evidence was led on both sides, a report was laid before Parliament in February, 1890, Mr. Parnell being acquitted of all the graver charges. He died in Brighton, England, Oct. 6, 1891.

Parnell, Thomas, an Irish poet; born in Dublin, Ireland, in 1679; was educated at Trinity College, and taking orders in 1705 was presented to the archdeaconry of Clogher, but resided chiefly in London. He was at first associated with Addison, Congreve, Steele, and other Whigs; but toward the latter part of Queen Anne's reign he joined the Tory wits, of whom the most notable were Swift, Pope, Gay, and Arbuthnot. He afforded Pope some assistance in his translation of Homer, and wrote the Life prefixed to it. By Swift's recommendation he obtained a prebend in the Dublin Cathedral and the valuable living of Finglass. After his death a collection of his poems was published by Pope in 1721. He died in 1717.

Parny, Evariste Désiré Desforges, Viscomte de (pä-r-nē'), a French poet; born in the Isle of Bourbon, France, Feb. 6, 1753. He won celebrity through his volume of "Erotic Poems," which first appear-

Parodi

ed in incomplete form, 1778, completed 1781: Voltaire saluted him, "My dear Tibullus." In 1799 he published "The War of Gods," afterward enlarged and named "The Christianide"; it is a cynical and impious attack on all religions. He published (1805) "The Stolen Portfolio," containing "Venus's Disguises," "Gallantries of the Bible," "Paradise Lost." He died in Paris, Dec. 5, 1814.

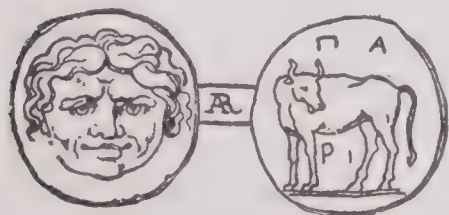
Parodi, Dominique Alexandre, a French poet of Greek origin; born in the island of Crete, Greece, Nov. 15, 1840. He spent his early years at Smyrna, then lived for a time at Milan, and afterward settled in Paris as a journalist. He wrote: "The Last of the Popes," a novel, in Italian; a volume of French verses, "Passions and Thoughts" (1865); "Messenian Tales" (1867); "The Triumph of Peace" (1878); "Flesh and Soul Cry Out" (1883). He wrote also the tragedy "Rome Vanquished" (1876), and the Scriptural poem "Sephora" (1877). He died June 23, 1901.

Parody, a kind of writing in which the expression, form, and style of a serious composition are closely imitated, but treated in a humorous or burlesque manner; a burlesque imitation of a serious composition; a travesty or burlesque in which the form and expression of the original are closely adhered to.

Parole, a word of promise; a word of honor; faith plighted; specifically a promise given by a prisoner on his honor that he will not attempt to escape if allowed his liberty, or that he will return to custody on a certain day if released, or that he will not bear arms against his captors for a certain time, etc. Also a password; a word given out each day in orders by the commanding officer in camp or garrison, by which friends and foes may be distinguished. It differs from a countersign in being given only to officers, or those who inspect and give orders to the guard, while a countersign is given to all guards.

Paropamisus, an ancient name still used for a ridge, less than 1,000 feet above the adjacent country, which forms part of the N. edge of the great plateau of Persia and Afghanistan, almost connecting the Hindu-kush with the Elburz Mountains.

Paros, one of the larger islands of the Cyclades division of the Greek Archipelago; a low pyramid in shape, it has an area of



COIN OF PAROS.

64 square miles; pop. nearly 7,000, of whom some 2,200 live in the capital, Parœkia. Wine, figs, and wool are exported. The quarries of the famous white Parian marble are near the summit of

Parr

Mount St. Elias (ancient Marpessa), and are not yet exhausted. Archilochus and Polygnotus, the painter, were born on Paros.

Parotid Glands, a pair of glands situated, one on each side of the cheek, near the junction of the upper and lower jaws. Their chief function is the secretion of pure saliva through the parotid duct, to assist in the processes of mastication and deglutition.

Parquetry, inlaid wood-work in geometric patterns, generally composed of two different tints, and principally used for floors.

Parr, in ichthyology, the popular name of what was formerly believed to be a distinct salmonoid species, *Salmo salmulus*.

Parr, Catharine, the 6th wife of King Henry VIII.; daughter of Sir Thomas Parr; born in 1512. Married first to one Edward Borough, possibly Lord Borough, and afterward to Lord Latimer, she on July 12, 1543, became queen of England by marriage with Henry VIII. She was distinguished for her learning and for her knowledge of religious subjects, her discussion of which with the king had well nigh brought her to the block, like so many of her predecessors. Her tact, however, saved her; for she made it appear to the king's vanity that she had only engaged him in discourse about the Reformation in order to derive profit from his majesty's conversation. She persuaded Henry to restore the right of succession to his daughters, and interested herself on behalf of the universities. After Henry's death she married (1547) Sir Thomas Seymour, and died in the following year.

Parr, Samuel, an English educator; born in Harrow-on-the-Hill, England, Jan. 15, 1747. He was chief assistant at Harrow, 1767-1771; afterward master of schools at Colchester and Norwich; and prebend of St. Paul's, London. He was famous for extent and variety of learning and for conversational powers. His writings (1828) include sermons, memoirs, reviews, dissertations, etc.—a mass of crude scholarship not focussed to any special field, and perishing with itself. "Aphorisms, Opinions, and Reflections by Dr. Parr" (1826) was an effort to preserve some of the talk which helped to make him a popular colossus in his day. He died in Hatton, March 6, 1825.

Parr, Thomas, better known as OLD PARR, born, it is said, in 1483 in Winnington, Shropshire, England. A metrical account of his career was published in 1635 by John Taylor the "water poet," and he was buried in Westminster Abbey, where a monument records his longevity. His age,

however, has been disputed, and doubtless he was not nearly so old as represented. He died in 1635.

Parrakeet, or **Parakeet**, a popular name for any of the smaller long-tailed parrots. The word is in common use, but is applied without any strict scientific limitation to birds of different genera, and even of different families. Generally speaking, any old-world parrot with a moderate bill, long and more or less graduated tail, with the ends of the feathers narrowed, and high and slender tarsi, is called a parrakeet. The crested parrakeet, or parrakeet cockatoo, is *Nymphicus novæ-hollandiæ*; the genus *Platycercus* contains the wide-tailed parrakeets; and *Platycercus caledonicus* and *P. eximius* are known respectively as the yellow-bellied, and the rose or nonpareil parrakeet, sometimes called the rosella parrot. *Pezoporus formosus* is the ground parrakeet, and grass parrakeet is a popular name for the Australian genus *Melopsittacus*. *Palæornis torquatus*, the rose-ringed parrakeet, is a familiar cage bird, as is the Alexandrine parrakeet (*Palæornis alexandri*), so named from the supposition that it was brought to Europe by Alexander the Great. It was well known to the Greeks and Romans, and Ovid has described it in one of his daintiest elegies.

Parramatta, a town of New South Wales; on a W. extension of Port Jackson, 14 miles W. of Sydney, with which it is connected both by steamer and railway. The streets are wide and regular. "Colonial tweeds," "Parramatta cloths" (first made at Bradford from wool exported hence), beer, soap, candles, and tiles are manufactured. Much fruit, especially the orange, is grown here. Parramatta, formerly called Rosehill, is, after Sydney, the oldest town in the colony, having been laid out in 1790.

Parrhasius, one of the greatest painters of ancient Greece, was at Athens and already distinguished before the end of the 4th century B. C. According to Xenophon, he held a conversation with Socrates, and he was a younger contemporary of Zeuxis. Parrhasius appears to have surpassed all his predecessors in purity of design, accuracy of drawing, force of expression, and what is technically called "finish." And it seems that his vanity and pride were equal to his artistic skill.

Parricide, one who murders his father, ancestors, or any one to whom reverence is due. The Athenians had no law against parricides, from an opinion that human atrocity could never reach to the guilt of parricide. This was also originally the case at Rome; but at a later period parricide was punished by the Roman law with greater severity than any other kind of homicide. The delinquent, after being

scourged, was placed in a leathern sack, with a dog, a cock, a viper, and an ape, and so cast into the Tiber. The English and American law treat this crime as simple murder.

Parrot, the popular name for any individual of a well-known group of birds from the warmer regions of the globe, remarkable for the brilliant, and in some cases gaudy, coloration of their plumage, and the facility with which many of them — notably the genera *Chrysotis*, *Palæornis*, and *Psittacus* — acquire and repeat words and phrases.

Parrot Coal, a name given to anthracite because of the crackling or chattering noise it makes when burnt.

Parrot Fish, or **Parrot Wrasse**

(*Scarus*), a genus of fishes of the family *Labridæ*. The name seems to refer to the frequently bright colors, and partly to the shape of the mouth; for the jaws form a strong and sharp beak, and the teeth are soldered together. Over 100 species are known, especially from the tropical coral banks, on which they browse. The most N. species (*S. cretensis*) is the famous scarus about which Greek and Roman epicures were extraordinarily enthusiastic. Wonderful stories were told of its love, its wisdom, its habit of rumination, and the sounds which it makes. Pliny relates that in the reign of the Emperor Claudius a lot of scari were brought from the Troad, released in the Italian sea, and strictly protected for five years till they became very abundant. The fish feeds chiefly on fucus, and is certainly very palatable.

Parrott Gun, a kind of rifled cannon invented by Capt. R. G. Parrott of the Cold Spring Foundry, West Point, N. Y., and much employed in the United States during the Civil War. The body of the gun is of cast iron, and is reinforced at the breech by shrinking on a ring of wrought iron. The calibers are: 10-pounder, 2.9 inches bore; 20-pounder, 3.67 inches bore; 30-pounder, 4.2 inches bore; 100-pounder, 6.4 inches bore; 200-pounder, 8 inches bore; corresponding respectively to 3, 6, 9, 32, and 64-pounder smooth bores. The number of grooves increased with the caliber of the gun, the 10-pounder having three.

Parrott, Robert Parker, an American



GRAY PARROT.

Parry

inventor; born in Lee, N. H., Oct. 5, 1804; was graduated at the United States Military Academy in 1824; was Professor of Natural and Experimental Philosophy at the Academy in 1824-1826, and of Mathematics in 1826-1828. Commissioned a lieutenant, he served through the Greek war, and was afterward assigned to the Ordnance Bureau at Washington. After his resignation, he invented the well-known Parrott gun. He died in Cold Spring, N. Y., Dec. 24, 1877.

Parry, Sir William Edward, an English navigator; born in Bath in 1790. He entered the navy in 1803, and in 1818 accompanied Sir John Ross, as second in command, to Baffin's Bay, in an expedition for the discovery of the Northwest Passage. This expedition returned to England unsuccessful. But the year following, Lieutenant Parry was appointed to the command of the "Hecla" and "Griper" for a similar object; and this voyage resulted in the discovery of a considerable portion of the Northwest Passage, the ships wintering at Melville's Island. Captain Parry afterward commanded two other expeditions of a similar kind, but the nature of the ice on both occasions obliged the ships to return. In 1827 he again commanded the "Hecla" in an attempt to reach the North Pole. The ship was left at Spitzbergen, and Parry with his boats, succeeded in reaching the highest latitude attained up to that time ($82^{\circ} 45'$), but the drift of the ice S. prevented further advance. He died in 1855.

Parsees, or Guebers, the name of the small remnant of the followers of the ancient Persian religion, as established or reformed by Zoroaster (Zarathustra or Zerdusht). The relation in which Zoroaster stood to the ancient Iranian faith and his date have been much debated; the very fact of his historical existence has even been denied; and accordingly it is difficult to dogmatize on the original principles of the Zoroastrian faith. It has been alleged that at first the doctrine was a pure monotheism; that Zoroaster taught the existence of but one deity, the Ahura-Mazdão (Ormuzd), the creator of all things, to whom all good things, spiritual and worldly, belong. The principle of his speculative philosophy, on the other hand, was dualism: there being in Ahura-Mazdão two primeval causes of the real and intellectual world—the Vohu Manô, the Good Mind or Reality (Gaya), and the Akem Manô, or the Naught Mind or Non-reality (Ajoyâiti). Certainly, however, the pure idea of monotheism, if it ever existed, did not long prevail. The two sides of Ahura-Mazdão's being were taken to be two distinct spirits, Ahura-Mazdão and Angrô-Mainyush (Ahriman), who represented

Parsees

good and evil—God and Devil. These each took their due places in the Parsee pantheon ere long, and Parsism became a characteristic dualism.

The Zoroastrian creed flourished up to the time of Alexander the Great, throughout ancient Irania, including Upper Tibet, Sogdiana, Bachtriana, Media, Persia, etc.; but after Alexander's death it gradually lost ground, rapidly declined under his successors, and under the Arsacidæ was much depressed. On the establishment of the Sassanians (A. D. 212), a native Persian dynasty, by Ardashir (Artaxerxes), the first act of the new king was the general and complete restoration of the partly lost, partly forgotten books of Zerdusht, which he effected, it is related, chiefly through the inspiration of a Magian sage, chosen out of 40,000 Magi. The sacred volumes were translated out of the original Zend into the vernacular and disseminated among the people at large, and fire temples were reared throughout the length and breadth of the land. The Magi or priests were all-powerful, and their hatred was directed principally against the Greeks. "Far too long," wrote Ardashir, the king, to all the provinces of the Persian empire, "for more than 500 years, has the poison of Aristotle spread." The fanaticism of the priests often also found vent against Christians and Jews. The latter have left us some account of the tyranny and oppression to which they as unbelievers were exposed—such as the prohibition of fire or light in their houses on Persian fast days, of the slaughter of animals, the baths of purification, and the burial of the dead according to the Jewish rites—prohibitions only to be bought off by heavy bribes. In return the Magi were cordially hated by the Jews; but later we frequently find Jewish sages on terms of friendship and confidence with some of the Sassanian kings. From the period of its reestablishment the Zoroastrian religion flourished uninterruptedly for about 400 years, till in A. D. 651, at the great battle of Nahavand (near Ecbatana), the Persian army under Yezdejird was routed by the Caliph Omar. The great mass of the population was converted to the Mohammedan faith; the small remnant fled to the wilderness of Khorasan, but were subjected, as might be expected, to severe oppression and persecution. Some 9,000 Guebers are still found in Persia, mainly in Yezd, Kerman, and at Teheran. Others, who preferred emigration to the endless tribulations inflicted on them by the conquering race, found a resting place along the W. coast of India, chiefly at Bombay, Surat, Ahmedabad, and the vicinity, where they now live under English rule, and are recognized as one of the most respectable and thriving sections of the community, being for the most part merchants and landed proprietors. Parsee

traders have also settled at Calcutta, Madras, Aden, Zanzibar, in Burma, and in China. They bear equally with their poorer brethren in Persia the highest character for honesty, industry, and peacefulness, while their benevolence, intelligence, and magnificence outvie that of most of their European fellow-subjects. Their general appearance is to a certain degree prepossessing, and many of their women are strikingly beautiful. In all civil matters they are subject to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when Zend, the holy language, is used by the priests, who as a rule, however, have no more knowledge of it than the laity. They are forward to embrace the advantages of English education, and not a few have studied law in England. Conspicuous among Parsee merchant-princes was Sir Jamsetjee Jejeebhoy. In 1881 there were 73,760 Parsees in British India, two-thirds of them in Bombay city.

Parsees do not eat anything cooked by a person of another religion; they also object to beef and pork, especially to ham. Marriages can only be contracted with persons of their own caste and creed. Polygamy, except after nine years of sterility and consequent divorce, is forbidden. Fornication and adultery are punishable with death. Their dead are not buried, but exposed on an iron grating in the Dakhma, or Tower of Silence, to the fowls of the air, to the dew, and to the sun, till the flesh has disappeared, and the bleaching bones fall through into a pit beneath, from which they are afterward removed to a subterranean cavern.

Ahura-Mazdâo being the origin of light, his symbol is the sun, with the moon and the planets, and in default of them the fire. Temples and altars must for ever be fed with the holy fire, brought down, according to tradition, from heaven, and the sully of whose flame is punishable with death. The priests themselves approach it only with a half mask over the face, and never touch it but with holy instruments. But however great the awe felt by Parsees with respect to fire and light (they are almost the only Eastern nation who abstain from smoking), yet they never consider these as anything but emblems of divinity. The fires are of five kinds. There are also five kinds of "sacrifice," which term, however, is rather to be understood in the sense of a sacred action—including the slaughtering of animals; prayer; the sacrifice of expiation, consisting either (1) in flagellation or (2) in gifts to the priests; and, lastly, the sacrifice for the souls of the dead. The purification of physical and moral impurities is effected, in the first place, by cleansing with holy water, earth, etc.; next, by prayers and the recitation of the divine word; but other self castigations, fasting, celibacy, etc.,

are considered hateful to the Divinity. The ethical code may be summed up in the three words—purity of thought, of word, and of deed: a religion "that is for all, and not for any particular nation," as the Parsees say. Various superstitions have in the course of the tribulations of ages and the intimacy with neighboring countries defiled the original purity of this creed, and its forms now vary much among the different communities of the present time. There are two main sects among them, as well as Conservatives and Liberals in usage, the latter allowing many innovations resisted by the others.

Parsley, *carum petroselinum* or *Petroselinum sativum*. The leaves are tripinnate, the flowers yellow. Found on walls, and in waste places, as a garden escape. There are three leading varieties of the plant, the common or plain-leaved, the curled, and the Hamburg sage or carrot-rooted parsley. The second is that more generally cultivated as a culinary vegetable; sheep feeding on it are said to be less liable than others to the rot. Various plants more or less resemble the above, such as beaked parsley, bur parsley, *Caucalis daucoides*; corn parsley, *Carum segetum*; fool's parsley, hedge parsley, *Caucalis (torilis) anthriscus*, and milk parsley, *Peucedanum palustre*.

Parsnip, *peucedinum sativum*, or *pastinaca sativa*. Leaves pinnate, leaflets sessile, ovate, inciso-serrate, flowers bright yellow. The boiled root is eaten as a vegetable; sheep and oxen fatten rapidly upon it; a kind of wine may be made from it; its seeds are aromatic and contain an essential oil.

Parson, the rector, vicar, or incumbent of a parish; one who has the parochial charge or cure of souls; a clergyman; one who is in holy orders, or has been licensed to preach.

Parsons, Albert Ross, an American pianist and musical critic; born in Sandusky, O., Sept. 16, 1847; pupil of Moscheles, Reinecke, Tausig, and Kullak: translator of Wagner's "Beethoven," Lessman's "Liszt," etc., and annotator of numerous pianoforte pieces.

Parsons, Eliza, an English novelist and dramatist; born in Plymouth, England. She wrote the farce "Intrigues of a Morning; or, An Hour at Paris" (1792), an adaptation of Molière's "Monsieur de Pourceaugnac"; the novels "History of Miss Meredith" (1790); "The Castle of Wolfenbach" (1793); "The Peasant of Ardenes Forest"; "The Mysterious Visits"; and others. She died in Leytonstone in Essex, Feb. 5, 1811.

Parsons, Mrs. Frances Theodora (Smith) (Dana), an American writer; born in New York in 1861. Under the name of "William Starr Dana" she pub-

lished: "How to Know the Wild Flowers"; "According to Season"; "Plants and their Children"; "How to Know the Ferns"; etc.

Parsons, Gertrude, an English novelist; born in 1812. Among her novels are: "Thornberry Abbey" (1846); "Emma Cross: A Tale" (1859); "Ruth Baynard's Story" (1861); "Major Vandemere" (1876). She wrote also "Life of St. Ignatius of Loyola" (1860); "Life of St. Collette" (1870). She died in Teignmouth, Feb. 12, 1891.

Parsons, Lewis Baldwin, an American military officer; born in Genesee co., N. Y., April 5, 1818; was graduated at Yale College in 1840 and at the Harvard University Law School in 1844; served through the Civil War; was chief of river and railroad transportation of the National armies; and was brevetted Major-General of volunteers in 1866. He died in 1907.

Parsons, Father Robert, the chief of the English Jesuits in their golden age; born in Somersetshire, England, in 1546. When 18 he passed from the free school at Taunton to St. Mary's Hall, Oxford, and after two years migrated to Balliol College, where he took his degrees of bachelor and master, and became a fellow and tutor. Here he twice took the oath abjuring the papal supremacy, but he never received orders in the English Church. His enemies in college brought charges against him which led to his forced retirement from Oxford in 1574. He shortly afterward became a Roman Catholic, and went to Padua with a view of there studying medicine, but, soon changing his mind, he set out on foot to Rome, and offered himself to the Society of Jesus, which he entered July 1575. He was ordained priest in 1578. When in the following year Dr. (afterward Cardinal) Allen, superior of the Douay seminary, succeeded in persuading the Jesuits to join with the seminary priests in the work of the English mission, Parsons and Campion were selected for the new venture. They left Rome in April, 1580, with strict injunctions to meddle neither directly nor indirectly in affairs of state. Parsons landed at Dover, June 11, disguised as a merchant of jewels, in a coat of "buff laid with gold-lace, with hat and feather." His activity and success took both Catholics and Protestants by surprise. He employed six printers on a secret press, and by the rapidity of his movements for 12 months baffled all the attempts of the government to catch him. But soon after the apprehension of his companion, Campion, in July, 1581, Parsons found it prudent to escape to the Continent, from which he never again returned to England.

Meanwhile, following the natural bent of his mind, and ignoring or evading his original instructions, he had busied himself with

state intrigues, sounded the political dispositions of influential Catholic laymen when treating with them of their consciences, and thought out schemes for the subjection of England to the Pope by force of arms. In Normandy, whither he at first retired, he had conferences with the Duke of Guise and with Father Creighton, who had been dispatched by the Pope into Scotland to negotiate with the Duke of Lennox for the liberation of the Queen of Scots; and a little later, during April and May, 1582, he was at Paris conferring with the Provincial of the French Jesuits, the Archbishop of Glasgow, the papal nuncio, and the agent of the King of Spain, concerning a project for the invasion of England. The plan, which was chiefly the offspring of Parsons' brain, was carried by Creighton to the Pope, and by Parsons himself to King Philip at Madrid. Now began his intimacy and influence with the Spanish king, and the series of political enterprises which culminated in the Armada of 1588. Affairs of state did not, however, exclusively occupy the Jesuit's active mind. At Rouen in 1582 he had finished his book, the "Christian Directory," which has found favor with Protestant divines; and, with the aid of the Duke of Guise, he founded at Eu a seminary for youth in preparation for the colleges of Douay and Rome. For a short time in 1588 he was rector of the college at Rome; and after the failure of the Armada he organized seminaries or clerical establishments for his countrymen at Valladolid in 1589, St. Lucar in 1591, Seville and Lisbon in 1592, and at St. Omer in 1593. In the reaction which followed on the death of Allen (1595) the jealousy and suspicion with which the more loyal section of the clergy had for some time regarded the ambitious schemes of the Jesuits and the Spanish party developed into a scandalous quarrel. Disturbances broke out among the prisoners at Wisbeach and in the English college at Rome. Parsons, who went from Madrid to Rome to again assume the rectorship of the English college, now persuaded the Pope to appoint George Blackwell, a partisan of the Jesuits, an archpriest over the secular clergy, with the view of keeping the chief direction of affairs, political and ecclesiastical, in his own hands. The appointment was resisted by the leaders of the seculars with an animosity which threatened to create a schism. Parsons, upon whom the odium of the appointment chiefly fell, was accused of deceiving the Pope, of tyranny over the clergy, and of continued treason against his country. The stringency of the penal laws against Catholics was laid at his door. An appeal carried to Rome by four delegates of the secular clergy led to a diminution of the Jesuits' power, though Parsons persisted to the end in resisting the endeavors of his opponents to obtain an episcopal government.

His industry and power of work were extraordinary. He wrote English forcibly and lucidly, and was a master in the arts of controversy. His domineering spirit and political partisanship created for him bitter enemies, while his mode of prosecuting his ends justly exposed him to charges of double dealing, equivocation, and reckless slander of his opponents. He was otherwise irreproachable in his private morals. His ambition was for his order and not for himself, and he modestly avoided the cardinal's hat. He knew how on occasions to exercise tact and prudence, and, when it was his purpose to do so, no one could write with more persuasive piety. Among the best known of his voluminous publications is "The Conference on the next Succession to the Crown," written with the assistance of Allen and Sir Francis Englefield in favor of the infanta of Spain. He here insists on the right of the people to set aside, on religious grounds, the natural heir to the throne; and advocates principles which afterward obtained for him the title of the first English Whig. Parliament made it treason to possess a copy of the book, which was reprinted in the interests of Cromwell in 1648. It was again reprinted in 1681, and publicly burned at Oxford in 1683. Another curious work by Parsons, for some time disseminated in manuscript only, was his "Memorial for the Reformation," in which he lays down rules for the guidance of the government, in the expected event of England's subjection to the Pope. The book was read at dinner time in the English college at Valladolid when Philip was preparing another Armada. The Jesuit's power of invective may be seen in his "Reply to the Edict of Elizabeth"—a bitter libel on the queen's ministers in reply to the royal proclamation of November, 1591. His "Apology" for the government of the archpriest (1601) is historically interesting, while his "Manifestation of the Great Folly and Bad Spirit of Certain in England calling Themselves Secular Priests," a passionate attack upon the conduct and morals of his clerical brethren, exhibits him on his weakest side. He died in Rome, as rector of the English college, April 15, 1610.

Parsons, Theophilus, an American jurist; born in Essex co., Mass., Feb. 24, 1750; was graduated at Harvard College in 1769, and studied law at Falmouth (now Portland), in Maine, where he was admitted to the bar in 1774; but he afterward removed to Newburyport. He was a member of the convention which, in 1779, framed the State constitution of Massachusetts and was also a member of the convention called to ratify the Constitution of the United States in 1789. In 1800 he removed to Boston. He was appointed in 1806 chief justice of Massachusetts, in which office he displayed signal ability. As a lawyer, "he

had," according to Justice Story, "no equal in Massachusetts"; and he probably had few, if any, superiors in the United States. A collection of his judicial opinions was published, under the title of "Commentaries on the Law of the United States." He died in 1813.

Parsons, Theophilus, an American author, son of the preceding; born in Newburyport, Mass., in 1797; was graduated in 1815 at Harvard College, where he became in 1847 Dane Professor of Law. He is the author of a "Treatise on the Law of Contracts" (1853); "Elements of Mercantile Law" (1856); "The Laws of Business for Business Men" (1857); "Treatise on Maritime Law" (1859); "Memoir of Chief-Justice Parsons" (1859); "Treatise on the Law of Promissory Notes and Bills of Exchange" (1862); "Laws of Partnership" (1867); "Deus Homo" (1867); "Treatise on Marine Insurance" (1868); "The Infinite and the Finite" (1872); and "The Rights of a Citizen of the United States" (1875). He died Jan. 26, 1882.

Parsons College, a coeducational institution in Fairfield, Ia.; founded in 1875, under the auspices of the Presbyterian Church; has grounds and buildings valued at over \$150,000; endowment funds, \$250,000; volumes in the library, 7,000; ordinary income, about \$27,000; average number of faculty, 20; average student attendance, 285; graduates since opening, over 360.

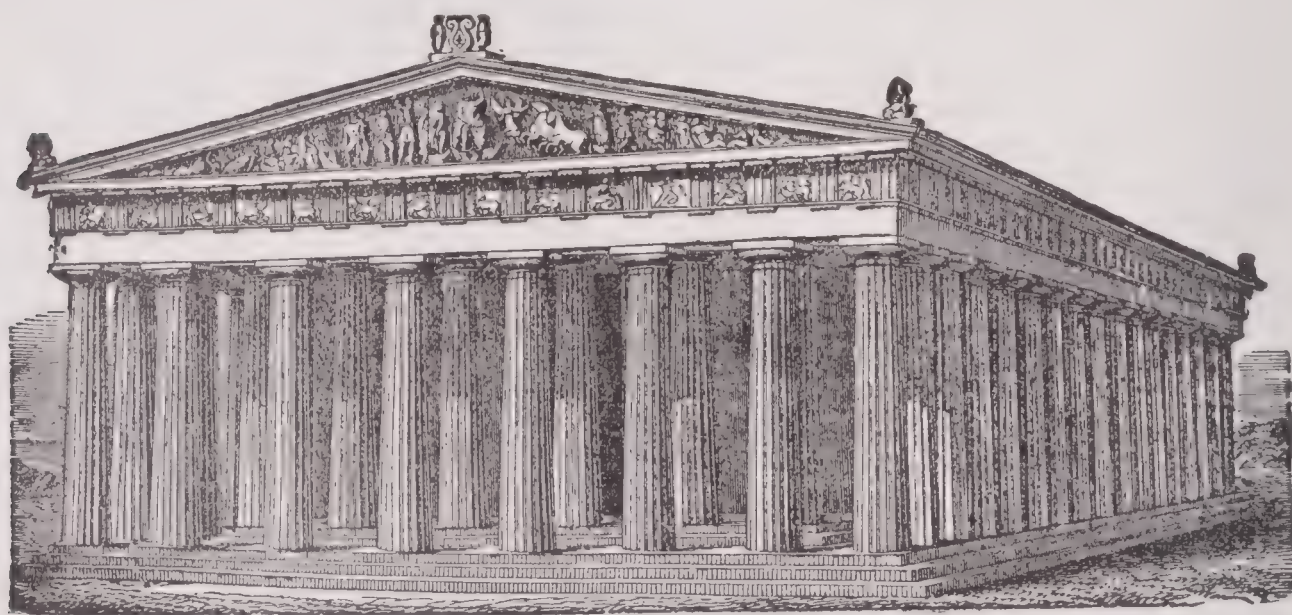
Parterre, an ornamental and diversified arrangement of beds or plots, in which flowers are cultivated, with intervening spaces of gravel or turf for walking on. Also, the pit of a French theater; a parquet.

Parthenogenesis, in biology, a term introduced by Professor Owen, who calls it also metagenesis. It signifies generation by means of an unimpregnated insect, which, moreover, is immature, not having yet passed beyond the larval state. Example, the genus *Aphis*. The winged aphides deposit eggs which produce imperfect wingless offspring, apparently mere larvæ. These larvæ, however, in some abnormal way, reproduce their species. By the time the process has gone on for 9 or 10 generations, the season is about closing, and the last brood of the larval aphides produce fully formed and winged specimens of the species, depositing eggs which are hatched in the following spring.

Parthenon, a celebrated temple at Athens, consecrated to Athena or Minerva, the protectress of the city. The Parthenon was built on an elevated rock near the Acropolis, and has always been regarded as the most exquisite and perfect example of Grecian architecture; it was built in the Doric style, and is one of the noblest monuments of antiquity. The Parthenon was erected about

448 B. C., in the time of Pericles, Phidias being the chief sculptor. It had a length of 228 feet, by a breadth of 100; it had eight columns beneath each pediment, and 15 on each side, exclusive of those at each end of the pediments, with which they formed 16 intercolumns, or 46 columns in all, exclusive of those within the building. The principal objects of art were a statue of Minerva, 26 cubits high, made of ivory and gold, in an erect position, with a lance in her hand, a shield at her feet, and Medusa's head on her chest—a work regarded as the masterpiece of Phidias. This magnificent fane had resisted the ravages of time down to the 17th century, being by turns a pagan temple, a Christian church, and a Turkish mosque, till at the siege of Athens by the Venetians, in 1687, a shell fell on the roof of the Acropolis or citadel, which, firing the magazine beneath, shattered that building and the Parthenon into blackened ruins.

ræan Sea in the S., and from the Indus in the E. to the Tigris in the W. The Parthians, originally an offshoot from the Scythians, were noted for their love of war and martial glory; they were the most celebrated horsemen in the world, and such excellent marksmen with the bow and arrow that, though in full flight and shooting backward, they could hit any object; their storm of arrows, discharged while flying from the field in full speed, being as fatal as those volleys poured on an advancing foe. The Parthians became subject to Persia; and their country, with Sogdiana and some other states, was formed into a province called a satrapy. When Alexander conquered Persia, he united Parthia and Hyrcania into one satrapy. After the dissolution of the Greek empire, the country became subject to Eumenes; next, to Antigones and the Seleucidæ—the Syrian kings—till 256 B. C., when, throwing off the yoke of their tyrant



THE PARTHENON RESTORED.

Early in the 19th century, it was mutilated by Lord Elgin, who removed to England its noblest sculpture.

Parthenopean Republic, the name given to the State into which the Kingdom of Naples was transformed by the French republicans in 1799; but the republic existed only for five months.

Parthia, a celebrated country of ancient Asia, called by the Greeks Parthyœa and Parthyene, which was bounded N. by Hyrcania, S. by Carmania Deserta, E. by Asia, and W. by Media. Parthia was a wild and mountainous country of great extent, having 25 large cities, of which the chief, and capital of the country, was Hecatompylon—so named from having 100 gates. When Parthia rose in the scale of nations and became a powerful state, the empire of Parthia was made up of conquered kingdoms, extending from the Caucasus in the N. to the Eryth-

masters, the Parthians established their independence under one of their own chiefs, Arsaces I., from whom all their succeeding monarchs received the name of Arsacidæ. Under this dynasty, the empire extended from the Indus to the Euphrates, and from the Oxus in the N. to the Persian Gulf in the S. This empire lasted for about 480 years, or from 256 B. C. to A. D. 226, when the last king, Artabanus, was murdered by a chief called Artaxerxes, a descendent of the first founder of the empire, who, usurping the throne, founded the new Persian empire, called the Sassanidæ.

Partibus, *in partibus*, or *in partibus infidelium*, in Church history, a phrase signifying "in the regions of unbelievers." A bishop *in partibus* is a titular bishop, whose see is in a heathen or non-Catholic country, though in the early ages of the Church it was subject to the see of Rome. Bishops

Participle

in partibus are usually consecrated to assist other prelates or for foreign missions.

Participle, a part of speech, so called because it partakes of the nature both of a verb and an adjective. A participle differs from an adjective in that it implies the relation of time, and therefore is applied to a specific act, while the adjective denotes only an attribute as a quality or characteristic without regard to time. Thus, in "I have written a letter," "written" is a participle denoting a specific act done at a certain time; but in "a written letter," "written" is an adjective. There are two simple participles in English, the present (or imperfect active) and the past (or passive). The former now ends in -ing; the latter in -ed, -d, or -t, in the case of weak verbs; in the case of strong verbs the past participles all once ended in -en or -n, as in know, known, sow, sown, but in very many cases this suffix has been dropped, in many other instances verbs originally strong have adopted a weak form for the past tense and past participle, as in sweep, swept (originally, swāpen, swepen), crow, crowed (originally crāwen, crown), etc. In such sentences as "seeing is believing," the termination -ing is not that of the present participle, but represents the Anglo-Saxon verbal termination -ung, as in showing = Anglo-Saxon *sceawung*.

Particular Baptists, a division of the Baptist denomination holding particular election. They published a "Confession of Faith" in 1643, revised in 1689.

Partition of Africa. See AFRICA.

Partition of China. See CHINESE EMPIRE.

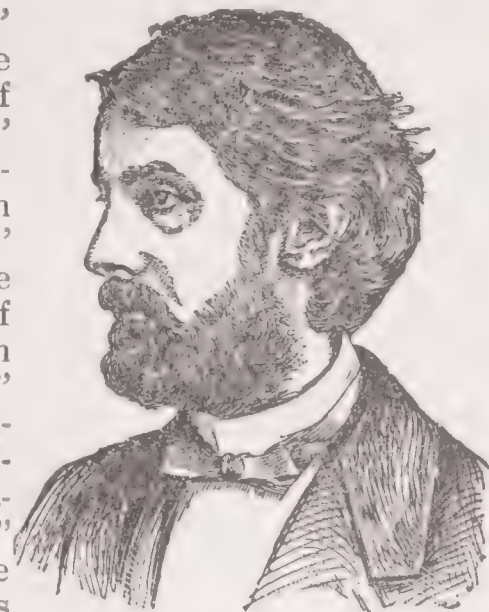
Partnership, the state or condition of being a partner, associate, or participator with another; joint interest. An association of two or more persons for the carrying on of any commercial, manufacturing, or other business undertaking, occupation, or calling, or a voluntary, verbal or written contract between two or more persons to join together their money, labor, goods, skill, etc., or all or any of them, for the prosecution of any business or undertaking, upon the understanding that the profits or losses shall be divided between them in proportion to the amount of capital, stock, labor, etc., supplied by each partner. Partners are known as "active" when they take an active part in the conduct of the business as principals; as "silent" when they do not take any active part, but are merely passive in the firm; and as "nominal" when they allow their names to be used, and so are held out to the world as partners, though having no actual interest in the conduct of the business or its profits.

Partridge

Parton, James, an American writer; born in Canterbury, England, Feb. 9, 1822. He wrote many valuable biographies, as:

"Life of Horace Greeley" (1885); "Life and Times of Aaron Burr" (1857); "General Butler in New Orleans" (1863); "Life and Times of Benjamin Franklin" (1864); "Famous Americans of Recent Times" (1870); "Life of Thomas Jefferson" (1874); "Life of Voltaire" (1881).

Among his other works are: "Humorous Poetry of the English Language" (1857); "Triumphs of Enterprise, Ingenuity, and Public Spirit" (1871); "Topics of the Time" (1871); "Caricature in all Times and Lands" (1875). He died in Newburyport, Mass., Oct. 17, 1891.



JAMES PARTON.

Parton, Sara Payson Willis, "FANNY FERN," an American essay-writer, sister of N. P. Willis, and wife of James Parton; born in Portland, Me., July 9, 1811. She is said to have contributed an article each week for 16 years, to the New York "Ledger." She published two novels—"Ruth Hall" (1854), a slightly veiled autobiography, and "Rose Clark" (1857); and collections from her contributions to the weekly press. She died in Brooklyn, N. Y., Oct. 10, 1872.

Partridge, the genus *Perdix*, and especially *P. cinerea*, the common or gray partridge, a well-known game bird widely distributed in Europe. General tone of plumage brown; neck and upper part of the breast, sides, and flanks bluish gray, freckled with dark gray, lower breast with a rich chestnut horseshoe shaped patch on a ground of white; sides and flanks barred with chestnut; thighs grayish white; legs and toes bluish white, claws brown. Length of adult male about 12 inches. In Eastern Siberia it is replaced by *P. barbata*, the bearded partridge; and there is a closely allied species in Tibet, *P. hodgsoniæ*. The partridge prefers open grounds, and often nests in exposed situations. It feeds on slugs, caterpillars, and grubs to a large extent, and so compensates the farmer for the injury it does. In the United States, any one of the several species belonging to the

Partridge

genus *Colinus*, including the bobwhite and other quail-like birds. Also a large bombard formerly used in sieges and defensive works.

Partridge, William Ordway, an American sculptor and writer on art; born in France, in 1861. He was the author of "Art for America" (1894); "The Song Life of a Sculptor" (1894); "The Technique of Sculpture" (1895).

Partridge Berry, a plant of the heath family, the *Gaultheria procumbens*, inhabiting North America, also known as winter-green. The name is also applied to another North American shrub, *Mitchella repens*, a pretty little trailing plant, with white fragrant flowers and scarlet berries, natural order *Rubiaceæ*.

Partridge Pigeon, a name for some of the Australian pigeons, otherwise called bronze wings.

Partridge Wood, formerly thought to be the wood of *Heisteria coccinea*, an Olacac, but now believed to be derived from various West Indian and South American trees, specially *Andira inermis*. It is beautifully variegated, and was formerly used in Brazil for shipbuilding. In dockyards it is called cabbage wood.

Party Wall, a wall separating two adjoining tenements; or a wall built upon the lands of adjoining owners, which furnishes support for the floors and roofs of the buildings on each side.

Parvis, or **Parvise**, the porch of a church; an area in front of the entrance to a church; a room above the church porch, sometimes used as a school. Also, a moot or disputation on points of law, so called from the place where it was originally held.

Parzanese, Pierpaulo, an Italian poet; born in Ariano, in the kingdom of Naples, about 1800; wrote: "Popular Songs"; "Songs of the Poor"; "Miscellaneous Verses"; "The Man of Viggiano." He died in 1852.

Pasadena, a city in Los Angeles co., Cal.; on the Southern California and the Los Angeles Terminal railroad; 9 miles N. E. of Los Angeles. It is a famous health resort, built at the foot of the Sierra Madre Mountains in a region of equable climate and such superb scenery that it has been named the "Italy of America." There being no marsh lands, malarial fevers and like ailments are entirely unknown. The soil of the region is very fertile and almost every kind of fruit belonging to temperate and semi-tropical climes is grown in great profusion. Pasadena contains the Throop Polytechnic Institute, high school, kindergartens, a public library, a number of churches, banks, and many hotels. The city

Pascal

was settled by a colony from Indianapolis in 1874, since which time it has greatly developed in horticultural enterprises. Pasadena has an assessed property valuation of nearly \$9,500,000. Pop. (1890) 4,882; (1900) 9,117; (1910) 30,291.

Pasagian, a sect of Judaizing Catharists which appeared in Lombardy late in the 12th century or early in the 13th century. They probably originated in the East and took their name from their wanderings, as if they were *passaggieri* = (birds of passage), or from some association with the Crusades, for which *pasagium* was a common name. They observed the law of Moses, but offered no sacrifices; and considered Jesus as a Demiurge by whom all other creatures were brought into being.

Pasargadæ, one of the most ancient cities of the Persians, containing a palace and great treasures, was in the province of Persis, and stood in a plain surrounded by mountains, on the river Cyrus. It is identified with ruins near the modern Murghab, N. E. of ancient Persepolis, and 70 miles N. E. of the modern Shiraz.

Pascagoula, a navigable river in the S. E. part of Mississippi, and formed by the junction of the Leaf and Chickasawha. It flows 85 miles S. to a small bay of the same name on the Gulf of Mexico.

Pascal, Blaise, a French author; born in Clermont, Auvergne, France, in 1623. His family was one of considerable distinction, his grandfather having been a treasurer of France at Riom, and his father president of the Court of Aids, in Auvergne. From his earliest childhood he exhibited precocious proofs of genius, especially in mathematics. Having been purposely kept in ignorance of geometry, lest his propensity in that direction should interfere with the prosecution of other studies, his self-prompted genius discovered for itself the elementary truths of the forbidden science. At 12 years of age, he was surprised by his father in the act of demonstrating, on the pavement of an old hall where he used to play, and by means of a rude diagram traced with a piece of coal, a proposition which corresponded to the 32d of the first book of Euclid. At the age of 16 he composed a small treatise on conic sections, which excited the mingled incredulity and admiration of Descartes. At 19 he invented his celebrated arithmetical machine, and at the age of 26 he had composed the greater part of his mathematical works, and made those brilliant experiments in hydrostatics and pneumatics, which have associated his name with those of Porricelli and Boyle, and ranked him among the first natural philosophers of his age. But a strong religious impulse having been imparted to his mind at this period, deepened, no doubt,

by the attacks of disease, which he had suffered uninterruptedly from his 18th year, he suddenly renounced the career to which his genius so unequivocally invited him, and thenceforward devoted himself to theology and polemics, and to the promotion of the spiritual and temporal welfare of his fellow men. After a short interval spent at Paris, he retired to Port Royal in 1654, where he spent the remainder of his days. The two works by which he is best known are his "Provincial Letters"; a caustic sat-



BLAISE PASCAL.

ire upon the Jesuits, published in 1656, under the name Louis de Montalte, and his posthumous "Pensées," which have always been regarded as among the richest repositories of eloquent thought and profound theology. He died in 1662.

Paschal, a stand or candlestick, of large size, used in Roman Catholic worship.

Paschal I., Pope, was a Roman, of the name of Paschasius, and succeeded Stephen V. in 817. He crowned Lothaire, the emperor, at Rome. He died in 824.

Paschal II., Pope; a native of Tuscany, succeeded Urban II. in 1099. He had a contest with the Emperor Henry IV., and also with Henry I., King of England, respecting the right of investitures. The former visited Rome, to be crowned by the Pope, who refused to perform the ceremony unless he yielded the matter in dispute. On this, Henry caused Paschal to be seized by his troops, which gave so much offense to the Romans that they rose in behalf of their pontiff, and Henry retired from Rome, but carried the Pope with him. Paschal, after a captivity of two months, conceded his claim to the investitures. This concession was afterward cancelled in two councils. He died in 1118.

Paschal III., became Pope in opposition to Alexander III. in 1164, through the influence of the Emperor Frederick I. He remained in possession of the papal chair while Alexander was absent at Benevento. He died in 1168.

Pasco, or **Cerro de Pasco**, a town of Peru, capital of the province of its own name, department of Junin, about 130 miles N. E. of Lima. It is situated 11,000 feet above sea-level, is badly built, and in a wretched condition. Its former importance was due to the rich silver mines in the vicinity, which have lately ceased to yield so abundantly.

Pas-de-Calais, a department in the N. of France, formed out of Artois and Picardy, and bounded on the W. by the Strait of Dover and the English Channel; area, 2,606 square miles; pop. (1906) 1,012,466. The surface is level, with the exception of a low ridge running to the N. W., and ending in Cape Gris-nez. The soil is fertile, mostly under cultivation, and watered by numerous short rivers, the majority of which are navigable and connected by canals. The coast line is 80 miles in length, and the shores are in certain parts low and sandy. The climate is exceedingly inconstant. Fishing is actively carried on, particularly in the neighborhood of Boulogne. Coal, iron, and other minerals are mined and worked, and considerable quantities of turf are cut. The industrial establishments are numerous and important, as iron foundries, beet root sugar factories, glass works, potteries, tanneries, and others. Boulogne and Calais are the principal harbors. The capital is Arras.

Pasewalk, a town of Prussia, 26 miles W. N. W. of Stettin, has varied industries. It was plundered and burned three times by the Imperialists in the Thirty Years' War, by the Poles in 1657, and by the Russians in 1713.

Pasha, or **Pashaw**, a Turkish title of honor bestowed originally on princes of the blood, but now also on governors of provinces, military officers of high rank, etc. Pashas are of three grades, distinguished by the number of horsetails which they are entitled to bear on a lance as a distinctive badge. Pashas of the highest rank bear three horsetails; governors of the more important provinces, two; and minor governors, one.

Pasht, in Egyptian mythology, a goddess chiefly worshiped in Bubastus, in Lower Egypt, whence her alternative name of "Bubastes." She was said to be the daughter of the great goddess Isis. She was represented with the head of a cat, the animal sacred to her.

Passaic

Passaic, a city in Passaic Co., N. J.; on the Passaic river, and on the New York, Susquehanna and Western, and the Lackawanna railroads; 12 miles N. W. of New York. It contains waterworks, electric street railroads connecting with Hoboken, Paterson and Newark, electric lights, Emergency Hospital, public library, National and State banks, and daily and weekly newspapers. It has extensive print works, woolen mills, bleachery, shoddy mills, whip factory, manufactory of blankets, etc., and an assessed property valuation of nearly \$10,000,000. Pop. (1890) 13,028; (1900) 27,777; (1910) 54,773.

Nested between the hills of Bergen and Passaic on the W. bank of the Passaic river lies the city of Passaic. "Picturesque Passaic," it has sometimes been called, and appropriately so. Twelve miles from New York, near enough to be in instant touch, as it were, nine miles from Newark, New Jersey's most progressive city, this city is really a part and parcel of the great metropolis, but still far enough away to be free from the obnoxious features of great cities.

Passaic well boasts of being a growing city — growing in population, growing in social development, growing in those lines that cannot fail to rank her among the most progressive cities of New Jersey. Her features and best points such as are of interest to those seeking suburban homes are manifold. Passaic points to her "eastern slope," a broad expanse of territory set upon a hill, where hundreds of New York business men and those whose walks in life permit of handsome homes have taken up their residences. Resting as it does upon the W. bank of the Passaic river, this city presents features of which few cities so near New York can boast. Her residential section is entirely given over to private homes, free from business and manufacturing interests, and free from all obnoxious features, while broad, well macadamized roads and flagged sidewalks, lined with handsome and varied forms of shade trees, have earned for the city the name of "Picturesque Passaic."

Passaic boasts one of the finest sewerage systems in the country. It was engineered by the late Colonel Waring, of New York. The drainage system is complete. There are almost 50 miles of macadamized roadways, and few of the principal avenues in the city are without the latest improvements. A complete electric and gas plant furnishes light for all the streets. The water supply is free from contamination, and is drawn 15 miles away in the mountains above Paterson.

City Hall Park is one of the handsomest spots in the State. It is always pointed out to the visitors, for from the tower of the city hall can be seen the Statue of Lib-

erty, the towers of the Brooklyn bridge, and many other points in New York. To the E. can be seen the Palisades, to the W. the Orange mountains and to the N. the Round Top and other ridges of Northern New Jersey.

Handsome homes, many of them surrounded by acres of well kept lawns, present an inviting appearance at all seasons of the year. The manufacturing interests of the city, as different in character as could be imagined, are set apart from the residence section. They are all to the E. of Main avenue, a street 200 feet broad, through which passes the Erie railroad. The business section, metropolitan in extent, is also centrally located and easy of access to the "Hill," an entire residential section.

Rents are lower than in any other city of less than 33,000 population, like Passaic. Houses costing from \$3,000 to \$2,000 can be had, though it might be said for the credit of the city that few are ever unoccupied for any length of time.

Passaic boasts an excellent city government that is progressive, up to date and nonpartisan. Its councilmen look after the welfare of the city, which accounts for its well kept streets and avenues. In its borders can be found the homes of many men prominent in business life, and two-thirds of them have selected Passaic of late years as their permanent homes through the progressive spirit shown by those who have the city's interests at heart. The Erie railroad runs 40 trains each way daily, while the Lackawanna has an excellent service.

Invested in church property alone, there being more than 35 separate congregations, is more than \$500,000. There are churches of every denomination and creed, and some of them have fine edifices, such as the Old First and the First Methodist, Presbyterian, Catholic, Baptist, and Reformed.

The schools of the city are thoroughly up to date. For the last three or four years the city has been erecting a new school building each year, at a cost of about \$50,000 each. There are many private institutions, such as the Collegiate School and others, besides the many handsome public school buildings, and the manual training and commercial schools.

The clubs, such as the Passaic Club, for men and women, and the Acquackanonk, are housed in modern structures, and contain all the latest luxuries of club life. Literary organizations and other forms of social intercourse are varied and well patronized.

It takes no longer to go from the vicinity of the city hall in New York to Passaic than from the city hall to lower Harlem, while trolley lines connect it with Jersey City, Newark, and all adjacent cities.

CHARLES M. HOWE.

Passau, a town of Bavaria, on a rocky tongue of land, on the right bank of the Danube, beside the influx of the Inn, and opposite the confluence of the Ilz with the Danube, close to the frontier of Austria, and 72 miles S. E. of Ratisbon. The city proper is connected with its suburbs on the other side of the Inn and the Danube by means of iron bridges; and picturesque hills encircle the whole town. The cathedral was rebuilt after a fire in 1680; the bishop's palace is now in part converted into public offices. The Passau Agreement between the Roman Catholic and Protestant estates of the empire was signed here on July 29 and Aug. 15, 1552. Passau was long an important fortified post, being looked upon as the key of the Danube in



PASSENGER PIGEON.

that part of its course. There were two strong citadels, one dating from 737, the other from 1215-1219, besides other fortified works. The town grew up around an old Roman camp, and in 739 was made the seat of a bishopric founded by St. Boniface. The town came into the hands of Bavaria in 1803. It has important manufactures of leather, porcelain, and parquet floors, besides boats, metal ware, and mirrors, and considerable trade in salt, timber, corn, and tiles. Pop. (1900) 18,003.

Passe Garde, the raised edges of the shoulder-plates of an armed knight, so constructed as to turn the blow of a lance, and prevent its entering the junction of the rerebrace and cuirass. They were adopted in the beginning of the 16th century, and were sometimes placed upon the metonnière.

Passenger Pigeon, the *Ectopistes migratoria* (Swain), *Columba migratoria*

(Linn.), also called wild pigeon and migratory pigeon. Upper parts generally blue; under surface brownish-red, fading behind into a violet tint. Sides and back of neck richly glossed with metallic golden-violet. Length of male, 17 inches; female smaller and duller in color. The eggs are never more than two, pure white, and broadly elliptical in form. It is found from the Atlantic to the great central plains, and from the Southern States, where it only occasionally occurs, to 62° N.

Passengers, in law, the railway and other public carriers contract to carry passengers without any negligence on their (the carriers') part. In case of accident it lies on the carrier to show that it was from no fault or negligence on his part, or on the part of his servants, that the accident occurred. Hence all passengers injured (or in case of death their nearest relatives) have a claim for compensation, unless it can be proved that the accident was due to the fault of the passenger. Passengers by sea are carried subject to the same general law as those by land; the carriers are bound to observe all due precautions to prevent accident or delay. In the case of imminent danger from tempest or enemies passengers may be called upon by the master or commander of the ship to lend their assistance for the general safety.

Passer, in ornithology, a genus of *Fringillidæ*, which in many classifications has been allowed to lapse. According to Brisson, the generic characters are: Bill hard, strong, sub-conical, bulging above and below; nostrils basal, lateral, rounded, almost hidden by projecting and recurved frontal plumes. Gape straight. First primary small and attenuated, but distinctly developed; third or fourth rather the longest. Tail moderate, nearly square. Tarsus stout, nearly as long as the middle toe. Claws moderately curved, rather short. Professor Newton makes the house sparrow *P. domesticus* and the tree sparrow *P. montanus*.

In the plural, *Passeriformes*, *Insectores*, an order of Aves, now generally placed first, and including the great mass of the smaller birds — crows, finches, flycatchers, creepers, etc. According to the scheme of Garrod and Forbes, the passerines are divided into two primary sections — *Eleutherodactyli* and *Desmodactyli*, according as the hind toe is free, or the muscles are joined by a band. The first section is again divided into the *Acromyodi* (= *Oscines*, *Polymyodi*, or *True Passerines*) and the *Mesomyodi* (= the *Clamatores* of some writers). Another grouping is that of Wallace, and further developed in his "Geographical Distribution of Animals." He makes the order consist of five groups; *Turdoid*, *Passerines* (23 families),

Tanagroid (10 families), Sturnoid (5 families), Formicaroid (10 families), and Anomalous (2 families); the whole approximately corresponding to the Acromyodi of Garrod and Forbes. The name was introduced by Linnæus, but is obsolete in the sense in which he employed it. The Passeres appear first in the Eocene Tertiary.

Passes, a tribe of Indians living in Brazil on the N. side of the Amazon, about the mouth of the Japura. They have always been friendly to the whites and are a peaceful, industrious race, many of whom lived in the mission villages in the 18th century. They are a branch of the great Arawak or Maypure stock.

Passiflora, the passion-flower; the typical genus of the order *Passifloraceæ*. Generally climbing herbs or shrubs, with ten-

P. incarnata (the May-apple), and *P. ser-rata* are eaten. The root of *P. quadrangu-laris* is emetic and narcotic; its fruit is called granadilla. *P. contrayerva* is alexi-pharmic and carminative. *P. fœtida* is em-menagogue and pectoral, the foliage is used in Brazil for poultices in erysipelas and other inflammatory skin diseases. The leaves of *P. laurifolia* are anthelmintic. *P. pallida*, *P. maliformis* (the sweet cala-bash), and *P. incarnata* are given in inter-mittent fever.

Passion Flower, the genus *Passiflora*. The three stigmas seemed to the devout Roman Catholics of South America to represent nails; one transfixing each hand, and one the feet of the crucified Saviour; the five anthers, His five wounds; the rays of the corona, His crown of thorns, or the halo of glory around His head; the digitate leaves, the hands of those who scourged Him; the tendrils, the scourge itself; while, finally, the 10 parts of the perianth were the 10 apostles—that is, the 12, wanting Judas who betrayed, and Peter who denied, his Lord.

Passionists, a congregation of Roman Catholic priests founded by Paul Francis (1694–1775), surnamed Paul of the Cross, in 1737. The first convent was established on the Celian Hill at Rome. It has been revived since 1830, and new houses have been founded in England, Ireland, Belgium, and Australia. They have been introduced lately in the United States, where they now possess four monasteries. The special objects of the institute was to instil into men's minds by preaching, by example, and by devotional practices, a sense of the mercy and love of God as manifested in the passion of Christ. Hence the cross appears everywhere as their emblem, in their churches, in their halls, and in the courts and public places of their monasteries. A large crucifix, moreover, forms part of their very striking costume. They go barefooted, and practise many other personal austerities, rising at midnight to recite the canonical hours in the Church; and their ministerial work consists chiefly in holding what are called "missions," wherever they are invited by the local clergy, in which



PASSION FLOWER.

sermons on the passion of Christ, on sin, and on repentance, together with the hearing of confessions, hold the principal places. **Passion Music**, music set to the narrative of our Lord's Passion in the Gospels. Dramatic representations of the subject date from a very early period, there being still extant a play ascribed, though somewhat

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Passion Music, music set to the narrative of our Lord's Passion in the Gospels. Dramatic representations of the subject date from a very early period, there being still extant a play ascribed, though somewhat

doubtfully, to Gregory Nazianzen, Bishop of Antioch. The dramatic performance of the passion arose in imitation of the ancient custom, still observed in the Roman Church, of dividing the recital of the Gospel of the Passion in Holy Week between two, three, or more readers, assigning those parts which reproduce the words of the people (*turba*) to the congregation or choir. To one priest was assigned the part of Jesus; to others those of Pilate, Judas, etc. All these parts were recited according to the rules of the *accentus ecclesiasticus*, while the people's part was delivered in monotone. Some of the best known settings are by Bach.

Passion Play, a mystery or miracle play founded on the passion of our Lord; a dramatic representation of the scenes of the passion. The only Passion play still kept up is that periodically represented at Oberammergau in Bavaria.

Passion Week. See HOLY WEEK.

Passometer, a small machine, with a dial and index hands like a watch, carried by pedestrians to record their steps in walking; a sort of odometer.

Passover, a festival instituted to commemorate Jehovah's "passing over" the Israelite houses while "passing through" those of the Egyptians, to destroy in the latter all the first-born (Exod. xii: 11, 12, 23, 27). The first passover (that in Egypt), those subsequently occurring in Old Testament times, and those of the New Testament and later Judaism, were all somewhat different. In the first of these a lamb without blemish was taken on the 10th, and killed on the 14th, of the month Abib, thenceforward in consequence to be reckoned the first month of the ecclesiastical year. The blood of the lamb was to be sprinkled on the two side posts and the single upper door post, and the flesh eaten "with unleavened bread and bitter herbs" before the morning (Exodus xii: 1-13). That night Jehovah, passing over the blood-stained doors, slew the first born in the Egyptian houses not similarly protected; and, as the emancipated Jews that night departed from Egypt, that first passover could have continued only one day. But the festival was to be an annual one. Connected with it was to be a feast of unleavened bread, continuing seven additional days, viz., from the 15th to the 21st of Abib, during which no leaven was to be eaten, or even allowed to be in the house (Exod. xii: 14-20; Num. xxviii: 16).

Sometimes the term passover is limited to the festival of the 14th of Abib; sometimes it includes that and the feast of unleavened bread also, the two being viewed as parts of one whole (Ezek. xlv: 21). When the

Jews reached Canaan, every male was required to present himself before God thrice a year, viz., at the passover, or feast of unleavened bread, at that of "harvest," and that of "ingathering" (Exod. xxiii: 16). The designations of the second and third suggest that the first also marked a stage in the agricultural year. It was, in fact, the spring festival (Deut. xvi: 9), held about the time when the first barley was ripe. In the Old Testament six passovers are mentioned as having been actually kept: That in Egypt (Exod. xii: 21-28), that in the wilderness (Num. ix: 1-14), that under Joshua at Gilgal (Joshua v: 10), that under Hezekiah (II Chron. xxx), that under Josiah (II Chron. xxxv), and that under Ezra (Ezra vi). After the exile wine was introduced, and is still used (Matt. xxvi: 17, 27, etc.). In modern Judaism no lamb is sacrificed, but the shank bone of a shoulder of that animal is eaten, leaven put away, and other ceremonies observed. Using passover in the sense of the paschal lamb, St. Paul applies the term to Christ, of whose death that of the paschal lamb was typical (I Cor. v: 7; John xix. 14).

Passow, Franz, a German scholar; born in Ludwigslust, Mecklenburg, Sept. 20, 1786; educated at Gotha and Leipsic, and in 1815 became Professor of Archæology at Breslau, in 1829 director also of the museum of art there. His "Greek Handbook" is the work that preserves his memory, and formed the basis of Liddell and Scott's "Greek Lexicon." He died March 11, 1833.

Passport, a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia and Turkey, in particular, a passport is indispensable. Passports to British subjects are granted at the Foreign Office, London. In the United States passports, with description of the applicant, are issued by the State Department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one dollar. They are issued only to citizens, native born and naturalized.

Pasta, Judith, an Italian singer; born in Italy, in 1799. She appeared on the Paris stage in 1821, and succeeded in winning a first-rate reputation. She first distinguished herself in the operas of Rossini. She retired to her magnificent villa on the Lake of Como about 1835, and died there in 1865.

Paste

Paste, a composition in which there is just sufficient moisture to soften without liquefying the mass, as the paste made of flour used in cookery. The term is also applied to a highly refractive variety of glass, a composition of pounded rock-crystal melted with alkaline salts, and colored with metallic oxides; used for making imitation gems. One variety of it is called strass.

Pastel, a solid colored pencil made of fine pipe-clay, gum water, and the required pigment. The executed work is also called a pastel or a drawing in chalk, and requires the protection of glass.

Pastern, that part of the leg of a horse between the joint next the foot and the coronet of the hoof. The first phalanx of the foot is called the great pastern bone; the second, the small pastern or coronary; the third, the coffin-bone, which is inclosed in the foot. Also a shackle for horses while pasturing; a clog, a tether.

Pasteur, Louis, a French chemist and physicist; born in Dôle, Jura, in 1822; educated at Jena University and the École Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed Professor of Physics in Strasburg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became Professor of Geology, Chemistry, and Physics at the École des Beaux-Arts, Paris; and in 1867 Professor of Chemistry at the Sorbonne. He became a member of the French Academy in 1882. He has been especially successful in proving the part played by microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms and cattle, and has achieved great success in his efforts to check hydrophobia by means of inoculation. To enable him to deal with this disease under the best conditions a Pasteur Institute was opened in Paris, where patients are received from all parts of Europe. A similar institution, in New York city, has proved very successful. He died in Paris, Sept. 28, 1895.

Pastil, or **Pastille**, an aromatic paste for burning, as a fumigator or disinfectant. It is composed of gum benzoin, sandalwood, spices, charcoal powder, etc. A kind of aromatic sugared confection.

Pasto, a town in the S. W. of Colombia, in a fertile valley 8,350 feet above sea-level. Above it rises the volcano of Pasto (14,000 feet above the sea); and in 1827 the town was destroyed by an earthquake. It manufactures cloth.

Paston Letters, The, a collection of letters written by and to members of the

Pastoral Poetry

Paston family in Norfolk during the period of the Wars of the Roses, four volumes of which were published by Mr. (afterward Sir) John Fenn, and a fifth by his literary executor, Sergeant Frere (London, 1787-1789 and 1823). These letters deal freely with the domestic affairs, the interests in public movements, the intriguing at elections, and the lawsuits of this particular family, and all the relations of English popular life in the period in which they were written. An accurate and extended edition in three volumes, by Mr. Gairdner, was published (1872-1875).

Pastor, a shepherd; now used almost exclusively in its figurative sense, for one who feeds the Christian flock; a minister of the Gospel, having charge of a church and congregation. In ornithology, a genus of *Sturnidæ*, with a single species, *P. roseus*,



PASTOR, OR ROSE-COLORED OUSEL.

the rose-colored ousel. Head, wings, and tail blue black, the feathers on the head forming a crest; back, scapulars, and rump, rose-colored. It has a wide geographical range, and in habits resembles the starling. It is often called the locust bird.

Pastoral Letter, a circular letter addressed by a bishop to the clergy and laity of his diocese for purposes of instructing them on some topic on which his advice and admonition are needed.

Pastoral Poetry, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly-corrupted artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse; and Vergil wrote his "Bucolics" and "Eclogues" in the corrupt Roman court. In the 16th century pastoral poetry received its most notable expression in the "Arcadia" of G. Sannazaro, the "Aminta" of Tasso, and the "Pastor Fido" of Guarini. This tendency, which was so potent in Italy, spread to

Pastoral Staff

England, and influenced the "Shepherd's Calendar" of Spenser, the "Arcadia" of Sidney, the "Faithful Shepherdess" of Fletcher, "As You Like It" of Shakespeare, and the "Comus" of Milton. The "Gentle Shepherd" of Allan Ramsay (1725) was the last successful dramatic pastoral.

Pastoral Staff, the official staff of a bishop or abbot. The pastoral staff of an archbishop is distinguished by being surmounted by a crozier. The pastoral staff is in the form of a shepherd's crook, and is delivered to the bishop, etc., at his investiture, and borne by him in all his solemn functions as an ensign of his jurisdiction. When borne by a bishop it was carried in the left hand with the crook turned outward, indicating his jurisdiction over a diocese; when assumed by an abbot, it was carried in the right hand, with the crook turned inward, showing that his jurisdiction was confined to the members of his own house. The pastoral staff was of metal or wood, enriched with metal or jewels, curved at the top, and pointed at the bottom.



PASTORAL
STAFF.

Pastoral Theology, that portion of the science which deals with the personal and official duties of pastors of churches.

Pastoureaux, the name given to those persons who took part in certain risings in France in the 13th and 14th centuries. It is probable that these outbreaks, of what Blunt calls "religious Jacquerie," were due in a large degree to the sufferings of the peasantry from the exactions of the nobility, and that the hostility displayed to the clergy was a consequence of their connection with the aristocracy. These outbreaks took place:

(1) In Berry in 1214. The peasantry pillaged chateaux and religious houses, and proclaimed universal equality and the coming of the Holy Ghost.

(2) In 1250; the ostensible objects were the rescue of Louis VII. and the recovery of the Holy Sepulcher. The rising originated in Flanders, under the leadership of a person of unknown name called the Master of Hungary, who, when he reached Paris, was at the head of 100,000 men. Here they not only usurped priestly functions, performed marriages, distributed crosses, offered absolution to those who joined the crusade, but they inveighed against the vices of the priesthood. They separated into three divi-

sions, and marched S., where they were attacked and cut to pieces.

(3) In 1320, in the reign of Philip V. This outbreak took place under the pretense of a crusade. The insurgents were excommunicated by Pope John XXII.; and being hemmed in in Carcassonne, numbers perished of disease and famine, and the survivors were put to death.

Pastry, articles of food made of paste or dough, which has been worked up with butter or fat, so that it assumes a light flaky appearance. There are several varieties, such as puff paste, paste for raised pies, and a light, spongy kind called "brioche." Pastry as a rule is somewhat indigestible.

Patagium, a membrane extending along the sides of the body in the flying lemur, flying squirrels, and some other animals. It is capable of expansion, so as to act as a kind of parachute, supporting the animal in its leaps from branch to branch or from tree to tree.

Patagonia, the name applied to that extreme portion of South America which is bounded E. by the Atlantic, W. by the Pacific, S. by the Strait of Magellan, and N. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion W. of the Andes (63,000 square miles) belongs now to the former, and the portion E. of the Andes (360,000) belongs to the latter. The Straits of Magellan form a S. boundary of 360 miles, and separate the mainland from the numerous islands of Tierra del Fuego. Here the Chilean government has established the settlement of Punta Arenas, with stations along the coast. Patagonia E. of the Andes consists mainly of vast undulating plains, frequently covered with shingle and broken up by ridges of volcanic rock. The vegetation is scanty, except in the region adjoining the Andes, and in many places there are shallow salt lakes and lagoons. The chief rivers are the Rio Negro, the Chupat, the Rio Desire, and the Rio Chico, all of which have their sources in the Andes, and run E. There are few if any good seaports. The Patagonians are a tall, muscular race averaging fully six feet in height, with black hair, thick lips, and skin of a dark brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle breeding. This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

Pataliputra. See PATUA.

Patamar

Patamar, or **Pattemar**, a kind of native vessel used by Bombay merchants and others for coasting voyages to and from that port. One of the larger kind is about 76 feet long, 21 feet broad, and 12 feet deep, with a burden of about 200 tons. It has two masts, with lateen sails. Smaller ones have but a single mast. They are grab built, that is, have a prow stem the same length as the keel. They are the best native vessels in India.

Patan, a walled town of India, in the territory of the Guicowar of Gujarat, 64 miles N. W. from Ahmadabad, stands on a tributary of the Banas. It manufactures swords, spears, pottery and silk and cotton goods. Standing on the site of the ancient Anhilwara, and the capital of native dynasties from the 8th century to the present day, Patan is surrounded with lofty walls, and has numerous architectural ruins. Pop. 32,712.

Patanjali, the name of two celebrated authors of ancient India, who are sometimes looked upon as the same personage, but apparently for no other reason than that they bear the same name. The one is the author of the system of philosophy called Yoga, the other the critic of Pānini, about 140 B. C.

Patapsco River, a stream in Maryland which flows into Chesapeake Bay, about 14 miles S. of the city of Baltimore. It is nearly 80 miles long. The part of it below Baltimore is an estuary 3 miles wide, and navigable for large ships.

Patavium. See PADUA.

Patawat, a tribe of North American Indians living on Lower Mad River, Cal.

Patches. During the whole of the 17th and beginning of the 18th century these fantastic ornaments were commonly worn by women and sometimes by men. In "Jack Drum's Entertainment," or "the Comedie of Pasquil and Katherine" (1601); they are thus mentioned: "For even as blacke patches are worne, some for pride, some to stay the Rheume, and some to hide the scab," etc.; and in the "Artificial Changeling" (1650), there is a woodcut showing the lady of fashion, with a coach, coachman, two horses, and postillions gummed on to her forehead, and the rest of her face ornamented with a star, two crescents, and a large round spot. In the same year (1650) a bill against "painting, black patches, and immodest dresses" was read for the first time, but got no further. The senseless custom was still rife when (1712) Pope described among the treasures of Belinda's toilet table, "Puffs, Powders, Patches, Bibles, Billet-doux" (Rape of the Lock, i: 138). Attempts have been made to revive the fashion, but without success.

Patent

Patchouli, **Patchouly**, or **Pachouli**, a perfume prepared from the plant described below. In botany, *Pogostemon patchouli*, a labiate plant growing in Silhet, Burma, and the Malayan peninsula. Large quantities of the plant are exported from Penang for stuffing mattresses and pillows; the leaves, which smell strongly, are supposed to keep off contagion. The dried roots furnish the patchouli of commerce.

Paté de foie gras, a dish made from the enlarged livers of overfed geese, and much relished by epicures. It is made in the form of a pie, and from its oily nature is very indigestible.

Patella, the same as knee cap. See KNEE. In zoölogy and palæontology, rock limpet; the typical genus of the family *Patellidæ*. The shell is oval, with a sub-central apex, the animal with a continuous series of branchial lamellæ, sessile eyes, and six lingual teeth. Recent species 144, from the shores of Great Britain, Norway, and other countries, living between high and low water marks. Fossil about 100, from the Silurian onward.

Paten, a plate used from early Christian times to receive the Host consecrated at Mass. At first the paten was made of glass, but the use of this material was forbidden in the 6th century. In England it was often made of the less precious metals, though gold or silver should properly be employed. Larger patens, called *ministeriales*, were used to hold the small Hosts for the communion of the laity. In the Roman Church the paten is consecrated by the bishop with chrism, and evidence exists that this rite was in use in the 8th century.

Patent, an exclusive right granted by a government (in letters patent or open, whence the name) to any person or persons to manufacture and sell a chattel or article of commerce of his own invention. A patent obtained in England does not extend to the colonies, but several of the colonies have machinery for granting patents for a like period. In France the term is 5, 10, or 15 years at the option of the applicant; in Prussia for 15 years; in Russia for 3, 5, or 10 years; in Spain for 5, 10, or 15 years; in Belgium, for 20 years; in Holland for 5, 10, or 15 years; in Austria not more than 15 years; in Sardinia 15 years. In the United States the person applying for a patent may present a petition, specification, oath, and filing fee, with a drawing if the nature of the case admits of it. Sec. 4884 "Revised Statutes of the United States" reads: "Every patent shall contain a short title or description of the invention or discovery, correctly indicating its nature and design, and a grant to the patentee, his heirs, or assigns, for the term of 17 years, of the exclusive right to make, use, and vend the invention or discovery throughout the

United States and the Territories thereof." Design patents are granted for periods of three years and six months, seven years, or 14 years, at discretion of the applicant. Patents are extended only by special congressional legislation. The filing of a caveat prior to applying for a patent entitles the inventor to notice of an interfering application filed during the life of the caveat (one year), during which he may perfect his invention. The alleged inventions set forth in caveats are transferable. Special facilities are given American inventors for securing patents in foreign countries, by a provision for keeping an application in the secret archives of the patent office for six months, to enable the inventor to arrange foreign patents.

Patentable Inventions.—By the statute of 1870 it was enacted that an invention to be patentable, must possess, among other qualifications, that of newness. What is the newness must be determined according to the circumstances of each particular case. In suits for infringement the point under discussion usually is whether the alleged invention is or is not substantially identical with some prior existing thing which has been in common use here or described in some patent or printed publication. The verdict of "no novelty" must be pronounced where a new use is made of an old invention. He who produces an old result by a new mode or process is entitled to a patent for that mode or process; but he cannot have a patent for a result merely without using some new mode or process to produce it. A man is entitled to all the benefit of the article which he has invented and patented. Another who happens to discover an additional use to which the invention may be applied does not, by that discovery and application create a patentable novelty. A mere aggregation of things such as a hammer with a screwdriver inserted in one end of the hammer and an awl in the other is not patentable; it is otherwise if the aggregation is such that the individuality of the component parts is lost. The combined glasscutter, screwdriver, canopener, etc., for instance, consists of but one invention in reality, the utility of the parts of which would be lost by division. A simple alteration in the form, size, material or proportions of an existing device is not such a change as to produce a patentable novelty. This is the work of a constructor, not of an inventor. When there is an original principle of operation, a different result in kind, or a new combination, there exists a patentable novelty. When either the manufacture produced or the manner of producing an old one is new, there is the novelty contemplated by the patent laws. The safest guide to accuracy in making the distinction between form and principle has been adjudged to be to ascertain what is

the result to be secured by the discovery. Whatever is essential to that object, independent of the mere form and proportions of the thing used for the purpose, may generally, if not universally, be considered as the principle of the invention. A patent may be for a new combination of machines to produce certain effects, and this whether the machines constituting the combination be new or old. As a cumulative definition it may be said that novelty consists in producing a new substance, or an old one in a new way, by new machinery, or by a new combination of the parts of an old machine, operating in a peculiar, better, cheaper or quicker method, or a new mechanical employment of principles already known. No person otherwise entitled thereto is debarred from receiving a patent for his invention or discovery, by reason of its having been first patented or caused to be patented by the inventor or his legal representatives or assigns in a foreign country, unless the application for said foreign patent was filed more than seven months prior to the filing of the application in this country.

Applications.—Applications for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the same and of the manner and process of making, constructing, compounding and using it in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

When the nature of the case admits of drawings the applicant must furnish a drawing of the required size, signed by the inventor or his attorney in fact, and attested by two witnesses. In all cases which admit of representation by model, the applicant, if required by the Patent Office, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery.

The applicant shall make oath that he believes himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition or improvement for which he solicits a patent; that he does not know and does not believe that the same was ever before known or used before his invention or discovery thereof, and shall state of what country he is a citizen and

where he resides. In every original application the applicant must distinctly state under oath that the invention has not been patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to his application. If any application for patent has been filed in any foreign country by the applicant in the United States, or by his legal representatives or assigns, prior to his application in the United States, he shall state the country or countries in which such application has been filed, giving the date of such application, and shall also state that no application has been filed in any other country or countries than those mentioned; that to the best of his knowledge and belief the invention had not been in public use or on sale in the United States, for more than two years prior to his application.

On the filing of such application and the payment of the fees required by law, if, on examination, it appears that the applicant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the Commissioner will issue a patent therefor. Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States.

Reissues.—A reissue is granted to the original patentee, his legal representatives or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention. Reissue applications must be made and the specifications sworn to by the inventors, if they be living.

Caveats.—A caveat under the patent law, is a notice given to the office of the caveator's claim as inventor, in order to prevent the grant of a patent to another for the same alleged invention upon an application filed during the life of a caveat without notice to the caveat. Any citizen of the United States who has made a new invention or discovery and desires further time to mature the same, may, on payment of a fee of \$10, file in the Patent Office a caveat setting forth the object and the distinguishing characteristics of the invention and praying protection of his right till he shall have matured his invention. Such caveat shall be filed in the confidential archives of the office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof. The

caveat may be renewed on request in writing by the payment of a second fee of \$10 and it will continue in force for one year from the payment of such second fee.

Fees.—Fees paid in advance are as follows: On filing each original application for a patent, except in design cases, \$15. On issuing each original patent, except in design cases, \$20. In design cases, for three years and six months \$10; for seven years \$15, for 14 years \$30. On filing each caveat \$10. On every application for the reissue of a patent \$30. On filing each disclaimer \$10.

Statistics.—The receipts of the Patent Office during the year ending June 30, 1909, were \$1,975,919.97, and expenditures, \$1,887,443.35; receipts over expenditures, \$88,476.62.

The following is a statement of the business of the office for the year ending June 30, 1909:

Number of applications for patents.....	62,800
Number of applications for design patents.	1,186
Number of applications for reissue patents.	192
Number of applications for registration of trade marks	7,509
Number of applications for registration of labels	1,001
Number of applications for prints.....	338
Number of caveats filed.....	2,052
Number of disclaimers filed.....	11
Number of appeals on the merits.....	1,345
Total	76,434
Number of patents granted, including reissues and designs.....	35,215
Number of trade marks registered.....	4,547
Number of labels registered.....	779
Number of prints registered.....	231

Total	40,772
Number of patents withheld for non-payment of final fees.....	6,763
Number of patents expired.....	22,779

The total number of applications filed at the Patent Office in the 73 years, 1837-1909, was 1,659,249; number of caveats filed, 129,305; number of original patents, including designs, issued, 996,005; excess of all receipts of the office over all expenditures, \$7,060,547.

Pater, Walter, an English author; born in London, England, Aug. 4, 1839, and educated at King's School, Canterbury, and at Queen's College, Oxford, taking a classical second class in 1862. He was elected to an open fellowship at Brasenose; traveled in Italy, France, and Germany; and, both by his subtle critical insight and the exquisite finish of his style, earned his rank among the best prose writers of his time. With a wise reticence he husbanded his gift, hence all his work maintains the same high level of excellence. His books are "Studies in the History of the Renaissance" (1873), a series of essays on art and letters, on such men as Leonardo, Botticelli, Joachim du Bellay, and others, written in exquisitely modulated prose, with faint traces of a conscious daintiness, from which he soon shook himself free; "Marius the Epicurean:

his *Sensations and Ideas* " (1885), an imaginary biography of a young man brought up in Roman paganism, who passes through varied spiritual experience, meets Marcus Aurelius himself, and at last, shortly before his unexpected death, makes acquaintance with the mysterious new Eastern religion, yet without being profoundly influenced by it; *"Imaginary Portraits"* (1887) of Watteau, Denys l'Auxerrois, Sebastian van Storck, and Duke Carl, whose dream was "to bring Apollo with his lyre to Germany" half a century at least before his time; and *"Appreciations"* (1889), a volume of admirable criticism on Charles Lamb, Wordsworth, Coleridge, Rossetti, Sir Thomas Browne, Blake, and on style itself. He died July 30, 1894.

Patera, a round dish, plate, saucer, or goblet, used by the Greeks and Romans in their sacrifices and libations. They were commonly of red earthenware, sometimes of bronze and other metals, ornamented with a drawn pattern, and were especially used to contain the wine with which a libation was poured over the head of a victim on the altar. In architecture, properly an ornament on a frieze representing a round dish in bas relief, but the term is also applied to many flat ornaments not resembling dishes.

Paterculus, Gaius Velleius, a Roman historian; born about 19 B. C.; was a prefect or legate in the Roman army under Tiberius, and saw active service in Germania, Pannonia, and Dalmatia. His only extant work is the *"Roman History"* in two books; a compendium of universal, but more particularly of Roman, history. It is generally trustworthy, and valuable for confirmatory evidence. He died after A. D. 30.

Patereros, small pieces of ordnance, now obsolete, worked on swivels; most commonly used on board ships, where they were mounted on the gunwale, and discharged showers of old nails, etc., into hostile boats.

Paternoster, the Lord's Prayer, from the first two words of the Latin version; every 10th large bead in the rosary used by the Roman Catholics in their devotions. At this they repeat the Lord's Prayer, and at the intervening small beads an Ave Maria. Also a rosary. In architecture, a kind of ornament in the shape of beads used in baguettes, astragals, etc. In angling, a name given to a line to which hooks are attached at certain intervals, and also leaden beads or shot to sink it. (So called from its resemblance to a rosary.)

Paterson, a city and county-seat of Passaic co., N. J.; on the Passaic river, the Morris canal, and on the Lackawanna, the New York, Lake Erie, and Western, and the New York, Susquehanna, and Western railroads; 16 miles N. W. of New York. The city is chiefly noted for its silk industries,

on account of which it is called the *"Lyons of America."* It is built partly on the slopes of ranges of hills which surround it, and partly on a broad plain. On Feb. 2-3, 1902, the business portion of the city was destroyed by fire, entailing a loss of over \$10,000,000. The principal municipal buildings, churches, banks, public library, and the largest stores were swept away by the flames.

Business Interests.—Paterson is an important manufacturing center. Its silk mills are the largest in the United States having an output of over \$22,000,000 per annum, and employing about 12,000 persons. Its other manufactures include locomotives, paper, jute, machinery, iron, and steel, engines, boilers, linen, thread, malt liquors, etc. Prior to the fire there were several National and savings banks, and numerous daily, weekly and other periodicals. The assessed property valuation exceeds \$48,000,000, and the total bonded debt was about \$4,000,000.

Public Interests.—The city has an area of 8 square miles; 200 miles of streets, of which 55 miles are paved; and a sewer system covering 55 miles. The streets are lighted by gas and electricity at an annual cost of over \$85,000; the police department costs about \$115,000 per annum, and the fire department about the same amount. The annual cost of maintaining the city government exceeds \$1,500,000. The streets are well paved and broad. Among the local attractions are the Passaic Falls, 72 feet high. There were a public library, court house, asylums, hospitals, a high school, and many grammar schools.

History.—Patterson was founded in 1791 by a cotton manufacturing society which owed its origin to Alexander Hamilton. This society had a capital of \$1,000,000, with which it intended to lay the foundation of a great National manufacturing city. The city was named in honor of Gov. William Paterson of New Jersey. In 1851 it was incorporated as a city. Pop. (1890) 78,347; (1900) 105,171; (1910) 125,600.

Paterson, Robert, popularly known as *"Old Mortality,"* an English stone cutter, born near Hawick, in 1712 or 1715, served his apprenticeship as a stone mason to an elder brother near Lochmaben. He married soon after 1740, and, renting a quarry for himself, took to carrying gravestones into Galloway. From about 1758 he neglected to return to his wife and five children, and for upward of 40 years devoted himself to the task of repairing or erecting headstones to Covenanting martyrs, wherever such had been buried. So Joseph Train wrote to Scott, who tells how about 1800 he himself met *"Old Mortality"* at Dunnottar, engaged *"in the usual business of his pilgrimage."* From the old man's son, however, Train got a different story,

without a hint of Cameronian zeal. Paterson died in Bankend, England, Jan. 29, 1801, and was buried at Caerlaverock, where a monument was erected to him by the Messrs. Black in 1869.

Paterson, William, a British financier; born in Dumfriesshire, Scotland, in 1658. He went through England as a pedlar, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors. Before this time he had conceived the project of founding a free emporium of trade in Darien, and in 1695 he obtained the sanction of a Scotch act of Parliament constituting the Darien Company. After the failure of this great scheme he returned to England, broken in health and fortune. When the Treaty of Union between England and Scotland was concluded in 1707, Paterson, who was one of its warmest advocates, after much difficulty received an indemnity (of \$90,000) for the losses he had sustained. Paterson was a great financial genius, but most of his views (such as his advocacy of free trade) were far in advance of his time. He died in London in 1719.

Pathology, the branch of medical science which treats of disease. It investigates its predisposing and existing cause, its characteristic symptoms, and its progress from first to last. Sometimes this is called internal pathology, while external or surgical pathology treats of those lesions or deformities which require surgical treatment for their removal. Another division is into human pathology, which occupies itself with the diseases of man, and comparative pathology, which makes comparison between the diseases of man and those of the inferior animals. Vegetable pathology treats of the diseases of plants.



COVENTRY PATMORE.

Patina, a bowl of metal or earthenware; a patella. Also the green æurogo, or rust, which covers ancient bronzes and metals, and which, being one great proof of age, has often been fraudulently imitated by forgers of antiquities, by the action of acetic acid.

Patmore, Coventry Kearsley Deighton, an English poet; born in 1823. He published his first volume of poems in 1844, became assistant librarian at the British Museum, and associated himself with the pre-Raphaelite movement. His reputation as a poet was established by the publication of the four parts of "The Angel in the House" (1854-1863), which he revised in successive editions. Besides this he published "The Unknown Eros and other Odes," a poetical anthology called the "Children's Garland," a "Memoir of B. W. Proctor" (Barry Cornwall), and several contributions to periodicals. He died in Lymington, England, Nov. 26, 1896.

Patmore, Peter George, an English miscellaneous writer; born in London, in 1780. He wrote: "Imitations of Celebrated Authors, or Imaginary Rejected Articles" (1826); "My Friends and Acquaintances, being Memorials, Mind-Portraits, and Personal Recollections," etc. (1854); "Marriage in Mayfair," a comedy (1854). He died Dec. 19, 1855.

Patmos, a rocky and barren island, of most irregular outline, in the Ægean Sea, one of the Sporades, lying to the S. of Samos, now called Patino; area, 16 square miles. It is celebrated as the place to which the apostle John was exiled; in a cave here, it is said, he saw the visions recorded in the Book of Revelation. On the top of a mountain stands the famous monastery of "John the Divine," built in 1088. The island is under Turkish rule, but is inhabited by about 4,000 Greeks, mostly sponge fishers.

Patna, called also AZIMABAD, a city of Bengal, 140 miles E. of Benares, extends 9 miles along the Ganges and 2 miles back from the river; but the streets are narrow and crooked, and the houses mostly mean in appearance. Apart from the Gola or government granary (1786), the government opium factories, Patna College, the shrine of Shah Arzani, the mosque of Sher Shah, a Roman Catholic church, and a Mohammedan college, there are no buildings of moment. Its railway communication, and its central position at the junction of three great rivers, the Son, the Gandak, and the Ganges, avenues for the traffic of the Northwest Provinces, render Patna of great importance as a commercial center. The chief imports are cotton goods, oil-seeds, salt, sugar, wheat, and other cereals; they reach an annual value of nearly \$20,000,000. The exports, principally oil seeds and salt, with cotton, spices, English piece goods, cocoanuts, and tobacco, exceed \$35,000,000 in value. Patna, under its early name of Pataliputra, is supposed to have been founded about 600 B. C. It was visited by Megasthenes, the Greek historian, about 300 B. C., and called

Palibothra by him. In modern times Patna is notable as the scene of a massacre of British prisoners by Mir Kasim in 1763, which led to war and annexation by the English, and for the mutiny at Dinapur, the military station of Patna, in 1857. Patna ranks as the seventh city of India in point of population. Pop. (1901) 134,785.

Patna, a native State of the Central Provinces, India; area, 2,399 square miles; pop. 257,959. It has been under the management of a British political agent since 1871. Patna is the chief town, pop. 2,053.

Patois, the French term for dialects of a language spoken especially by the uneducated.

Paton, John Gibson, a Scotch missionary; born in Kirkmahoe, Dumfriesshire, Scotland, May 24, 1824. After some experience in Glasgow city mission, he offered his services for the foreign mission field in connection with the Reformed Presbyterian Church, and on his ordination he settled down toward the end of 1858 among the cannibal natives of Tanna. Here he labored amid trials and difficulties till 1862, when he was forced to leave, owing to the hostility of the natives. For the next 20 years his work was on the neighboring island of Aniwa, the whole population of which became Christian. Both by voice and pen he afterward attracted public attention and sympathy toward this field of mission labor; and his brother published and edited his graphic and thrilling missionary narratives, 1st and 2d series (1890). In 1891 he was made a D.D. of Edinburgh. He died Jan. 2, 1907.

Paton, Sir Joseph Noel, a Scotch historical painter; born in Dunfermline, Scotland, in 1821. He studied for some time at the Royal Academy; attracted attention by his outline etchings illustrative of Shakespeare and Shelley; exhibited his first picture of "Ruth Gleaning" at Edinburgh in 1844; gained one of three premiums at the Westminster competition by his fresco of the "Spirit of Religion," and a prize of \$1,500 by his paintings "Christ Bearing the Cross" and "The Reconciliation of Oberon and Titania." During subsequent years he produced many pictures, well known by engravings, such as "The Pursuit of Pleasure," "Home"—a soldier's return from the Crimea, "In Memoriam"—a scene from the relief of Lucknow, "Mors Janua Vitæ," "Faith and Reason," "Lux in Tenebris," "The Man with the Muck Rake," etc. He also published two volumes of verse. He died in Edinburgh, Dec. 26, 1901.

Patras, or **Patræ**, a fortified seaport town and the most important in the W. of Greece, climbs up a hillside and spreads out at its foot on the E. shore of the Gulf of Patras, 81 miles W. by N. of Corinth

and 137 W. of N. of Athens. It is a handsome city, having been almost entirely rebuilt after the ravages of the war of liberation (1821). It is defended by a citadel, is the seat of an archbishop, and has a spacious new harbor (1880) protected by a mole. It ships great quantities of currants, chiefly to Great Britain and France, the former taking from 50,000 to 60,000 and the latter from 18,000 to 38,000 tons annually. Besides currants, olive oil, wine, valonia, etc., are exported. The imports embrace chiefly woolen and cotton goods, iron, machinery, coal. Pop. 37,958. Patræ is the only one of the 12 cities of Achaia which still exists as a town; but most of its relics have been swept away by earthquake (551, 1820) and siege (by the Spaniards in 1532 and 1595, by the Knights of St. John in 1603, and by the Greeks, 1822-1828). It was an early seat of Christianity, having an archbishop before 347.

Patriarch, the father and ruler of a family; one who governs his family or descendants by paternal right. The term is usually applied to Abraham, Isaac, Jacob, and his sons, or the heads of families before the flood. In Church history, the highest grade in the hierarchy of ordinary jurisdiction, the see of Rome excepted. The jurisdiction of the bishops of Alexandria, Rome, and Antioch over their respective provinces is recognized by the sixth canon of the Council of Nice (A. D. 325). The title came into use in the 5th century. In the 4th Constantinople and in the 5th Jerusalem occupied the position of patriarchates. These Eastern sees have long been lost to the Latin Church, which admits a Maronite, a Melchite, and a Syrian Patriarch of Antioch, a Patriarch of Cilicia, of the Armenian, and a Patriarch of Babylon, of the Chaldean rite. There are also three minor patriarchs in the Western Church, the Patriarch of the Indies, the prelate of the highest rank in the church of Spain, the Patriarch of Lisbon, and the Patriarch of Venice.

Patrician, a Roman senator; a person of noble birth; a nobleman; a wealthy noble. Also one who is familiar with the writings of the early fathers of the Church; one versed in patristic learning. The Roman patricians consisted of about 300 *gentes*, houses, or clans, who, descending from the first Roman senators, constituted the aristocracy of the city and territory. To these were gradually added many individuals adopted into the *gentes*, and the descendants of both classes. Each of the *gentes* had a common name. They were subdivided into families. At first the patricians monopolized all high offices in the state, but after political contests with the plebeians, lasting for centuries, Licinius (365 B. C.) carried his rogation, by which

plebeians were admitted to the consulate, and to the custody of the Sibylline books.

Patrick, St., or **Patricius**, the apostle or patron saint of Ireland; said to have been born near the site of Kilpatrick, Scotland. His zeal prompted him to cross the channel for the conversion of the pagan Irish. His arrival in Ireland took place probably between 440-460. His endeavors were crowned with great success, and he established there a number of schools and monasteries. Nennius states that his missions continued 40 years, and various miracles are attributed to him, particularly the expulsion of all venomous creatures from Ireland. He died at an advanced age. His works, or at least those ascribed to him, were published, with remarks, by Sir James Ware, in 1658.

Patrick, St., Order of, an Irish order of knighthood, instituted by George III. in 1783, composed of the sovereign, princes of



BADGE OF THE ORDER OF ST. PATRICK.

the blood royal, a grandmaster, and 15 knights; the lord lieutenant of Ireland for the time being is grandmaster. The number of knights was increased to 22 in 1833.

Patripassianism, the teaching that God the Father became incarnate, and suffered for the redemption of man. It may be of two kinds: (1) Substituting, in the person of Jesus, the one undistinguished God for the divine nature of the Word; (2) attributing passibility to the Godhead. The former view was held by the Noëtians, Praxeans, and Sabellians; and Pearson

points out that the doctrine is involved in Arianism, as it is also in Apollinarian teaching.

Patroclus, in Greek story, the friend of Achilles, whom he accompanied to the Trojan war. His success was at first brilliant; but, Apollo having stunned him and rendered him defenseless, he was slain by Euphorbus and Hector. See **ACHILLES**.

Patrol, or **Patrole**, a walking or marching round of a guard in the night to watch and observe what passes, and to secure the peace and safety of a camp or other place. Also men on guard who go the rounds in the night; a detachment whose duty is to patrol; or a policeman whose duty it is to patrol a certain district or beat for the protection of property and to preserve the peace.

Patron, in Roman history, one who had manumitted a slave between whom and his manumissor a new relation was created, the freedman owing his former master the obedience of a son, and the patron assuming many of the rights which the power of patron conveyed. A member of any distinguished house chosen by a citizen who stood in need of a protector. Also any distinguished Roman who watched over the interests of subject states or cities. An advocate, a pleader, with duties somewhat analogous to those of a barrister.

Patron Saint, the saint under whose invocation countries, churches, religious houses or societies, or individuals are placed. The patron of a place is chosen by the people with the consent of the clergy; and of a church by the founder. There cannot be more than one principal patron of a country or church unless by Apostolic indult.

Patronage, Ecclesiastical, in British Church history, the right of presenting a fit person to a vacant benefice. In the earlier ages the bishops appointed the holders of all benefices, but subsequently when proprietors of lands began to erect and endow churches they obtained the privilege of nominating the clergyman. For a considerable time not only the nomination but also the investiture of the clergy were in the hands of laymen; but the hierarchy began to consider this an infringement of its prerogatives, and several successive popes and councils declared that the investiture was not valid unless it had also received the sanction of the ecclesiastical authority. Ecclesiastical patronage thus came to reside mainly in the Pope, and the principal benefices in Europe were filled by Italian ecclesiastics, who were often ignorant of the language of their flocks. In England this led to the Statutes of Provisors (1350-1415), by which persons who should attempt to enforce such appointments were

subjected to severe penalties. In England the sovereign is the patron paramount of all benefices which do not belong to other patrons; but a vast number of livings are in the gift of private persons, who possess the "advowson" as attached to their property. In Scotland the statute which abolished popery and recognized the reformed religion reserved the right of presentation to lay patrons (1567), and a subsequent statute (1592) asserted the rights of the crown and lay patrons in still stronger terms. On the establishment of Episcopacy the same principle was adopted in the act of 1612, by which presentations were appointed to be directed to the bishop. After the reestablishment of presbytery patronage was abolished (1649). It was again restored, however; again abolished; and again restored, in the last instance by an act of Queen Anne; and this rule remained with slight modification till 1874, when an act was passed by which the right of choosing their own minister devolved upon the congregation, the former patron to receive as compensation a sum equal to one year's stipend.

Patten, George Washington, an American poet; born in Newport, R. I., Dec. 25, 1808. Educated at the United States Military Academy, he served in the Mexican and Seminole wars. He acquired some reputation as a writer, and has been called the "poet-laureate of the army." Among his lyrics are: "The Seminole's Reply," once declaimed by most American school-boys; "Joys that We've Tasted"; and "An Episode of the Mexican War." He published in book form: "Artillery Drill" (1861); "Army Manual" (1863); "Voices of the Border," a collection of his poems (1867). He died in Houlton, Me., April 28, 1882.

Patterson, Joseph, an American banker; born near Norristown, Pa., Sept. 25, 1808. He early entered the banking business. During the Civil War, through his influence the bankers of the country made a loan of \$50,000,000 in gold to Secretary Chase, at the famous conference in New York and \$100,000,000 more in the year following. Secretary Chase constantly sought his advice on the financial policy of the administration. He died in Philadelphia, Pa., Sept. 25, 1887.

Patterson, Robert M., an American clergyman; born in Philadelphia, Pa., July 17, 1832; was official reporter of the United States Senate in 1850-1855; was graduated at Princeton Theological Seminary in 1859; and pastor South Presbyterian Church, Philadelphia, in 1867-1880. He was a member of the Pan-Presbyterian Councils in London in 1875, Philadelphia in 1880, and Belfast, Ireland, in 1884. Among his works are "Character of Abraham Lin-

coln" (1864); "Presbyterianism in Philadelphia" (1873), "Paradise, the Place and State of Saved Souls" (1874); "American Presbyterianism"; etc. He also edited Witherson's "What is the Apostolic Church?"

Patteson, John Coleridge, an English martyr; born in London, April 1, 1827, the son of Sir John Patteson, judge in the Queen's Bench, and of a niece of Coleridge, the poet. He passed through Eton and Balliol College, Oxford, and was elected a Fellow of Merton in 1852, and in the following year appointed curate of Alington, near Ottery St. Mary, in Devonshire. But his thoughts soon turned to missionary work, and in 1855 he sailed with Bishop Selwyn of New Zealand. The next 16 years he spent among the Melanesian Islands—New Hebrides, Banks, Solomon, and Loyalty Islands; and in 1861 he was consecrated Bishop of Melanesia. A most unselfish man and a true Christian, he was greatly beloved by the islanders, whom he likewise loved and faithfully watched over, protecting them to his utmost against the white kidnappers of the Pacific. He was killed by the natives of Nukapu, one of the Santa Cruz group, Sept. 20, 1871, it is believed in revenge for relatives carried away by the white slavers.

Patti, Adelina Maria Clorinda, a popular operatic singer of Italian extraction; born in Madrid, Spain, in 1843. After a course of professional study she sang at an early age in New York. Her debut in London took place in 1861 as Amina in "La Sonnambula," and she was ever afterward looked upon as one of the first singers of the day. Her voice was a high soprano, of rich, bell-like quality and remarkable evenness of tone; to these qualities she added purity of style and high artistic finish. She won golden opinions on the Continent wherever she appeared, receiving, in 1870, the Order of Merit from the Emperor of Russia. Her greatest success was generally considered to be in the part of Marguerite in Gounod's "Faust." In 1868 she was married to the Marquis de Caux, from whom, however she was divorced in 1876. She married Signor Nicolini in 1886; appeared in the United States, South America, and Mexico till 1892; was widowed in 1898; and married Baron Rolf Cederstrom in the following year, retiring then except for an occasional concert.

Patti, Carlotta, a popular Italian concert singer and sister of Adelina Patti; born in Florence, Italy, in 1840; made her debut in New York in 1861, and in England in 1863. She gave concerts throughout Europe and America with great success. She was married Sept. 3, 1879, to Ernest de

Pattison

Munck, a violoncellist of Weimar, and died in Paris, June 27, 1889.

Pattison, Mark, an English writer; born in 1813; was educated at Oriel College, Oxford; received a fellowship in 1839; and two years subsequently was ordained and won the Denyer theological prize. In 1853 he was appointed tutor of his college, and in 1861 became rector (or head) of Lincoln College. He devoted himself to university reform, for this purpose made many journeys to Germany, and was assistant commissioner on the educational commission of the Duke of Newcastle. He was a contributor to the famous "Essays and Reviews," and published an edition of "Pope's Epistles and Satires" (1869), a work on "Isaac Casaubon" (1875), a memoir of Milton in the Men of Letters Series (1879), the "Sonnets of Milton" (1883), and numerous articles in reviews, etc. He died in 1884.

Pattison, Thomas Harwood, an American educator; born in Cornwall, England, Dec. 14, 1838. For many years he was Professor of Homiletics and Pastoral Theology at Rochester (N. Y.) Theological Seminary. He also was the author of many ecclesiastical works, including "The History of the English Bible" (1894). He died Feb. 13, 1904.

Patton, Francis Landley, an American educator; born in Warwick Parish, Bermuda, Jan. 22, 1843. He was educated at Knox College and the University of Toronto, and was graduated at Princeton Theological Seminary in 1865. In 1865-1871 he was pastor of several churches was then chosen McCormick Professor in the Theological Seminary of the Northwest; and in 1881 Professor of Relations of Philosophy and Science to the Christian Religion in Princeton University, the chair having been especially created for him. He was president of the university in 1888-1902; then became president and Professor of the Philosophy of Religion at Princeton Theological Seminary.

Patton, Frank Jarvis, an American inventor; born in Bath, Me., in 1852; was graduated at the United States Military Academy in 1877; invented the multiplex telegraph system and the gyroscope now used on ocean vessels to determine their position at sea. He died in New York city, Nov. 12, 1900.

Patton, Jacob Harris, an American historian; born in Fayette co., Pa., May 20, 1812. He published: "A Concise History of the American People" (1869-1882); "Yorktown, 1781-1881" (1881); "The Democratic Party, its History and Influence" (1884); and "The Natural Resources of the United States" (1888);

Paul

"Political Parties in the United States," etc. He died Nov. 24, 1903.

Pau, the chief town of the French department of Basses-Pyrénées, on the right bank of the Gavede-Pau, 66 miles E. S. E. of Bayonne and 143 S. S. E. of Bordeaux. It occupies a rocky height, 623 feet above sea-level, and commands toward the S. most magnificent views of the serrated Pyrenees; indeed, for mountain scenery its situation is surpassed by no other town in France. The ancient capital of the kingdom of Béarn and French Navarre, it has a noble five-towered castle, rising to a height of 110 feet, rebuilt about 1363 by Gaston Phœbus, Comte de Foix, and restored by Louis-Philippe and Napoleon III. Linen and chocolate are its chief manufactures; and in the vicinity Jurançon wine is grown, and many swine are fed, whose pork supplies the famous hams of Bayonne. Pau is a great English resort during the winter season (October to May), and is famous for its golf links. Pop. (1906) 35,044.

Pauchonti Tree, *Isonandra polyandra*, a large tree found in the mountain regions of India, and from which a substance of the nature of gutta percha is procured. The wood of the pauchonti is close grained and heavy.

Paul, the name of five Popes, as follows:

PAUL I., Pope; the successor of Stephen, in 757. He engaged in dispute with Desiderius, King of the Longobards, but was taken under the protection of Pepin, King of the Franks. He died in 768.

PAUL II., Pope; succeeded Pius II. in 1464. He sought to organize a league of the Christian princes against the Turks, who at the time threatened to invade Italy, and also endeavored to establish peace among the different Italian States. He had a great dislike to profane learning, and shut up an academy which had been formed at Rome for the cultivation of Greek and Roman learning, many members of which were imprisoned and tortured. He died in 1471.

PAUL III., Pope; named Alexander Farnese; was elected to the papal chair in succession to Clement VII. in 1534. In his reign the Council of Trent was called. He established the Inquisition, confirmed the Society of Jesuits, condemned the interim of Charles V., and acted with rigor against Henry VIII. of England. Died in 1550.

PAUL IV., Pope; Giovanni Pietro Caraffa; born in Naples, in 1476; succeeded Marcellus II., in 1555, and displayed an energy in his administration which had not been expected from his advanced age and previous studious habits. He established a censorship, and completed the organization of the Roman Inquisition; he took measures for the alleviation of the burdens

Paul I.

of the poorer classes, and for the better administration of justice, not sparing even his own nephews, whom he banished from Rome on account of their corrupt conduct and profligate life. His foreign relations, too, involved him in much labor and perplexity. He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, with Cosmo, Grand-Duke of Tuscany. Having condemned the principles of the Peace of Augsburg, he protested against its provisions. Under the weight of so many cares, his great age gave way, and he died in 1559.

PAUL V., Pope; Camillo Borghese, born in Rome, in 1552; was elected in 1605, after the death of Leo XI. He had a dispute



POPE PAUL V.

with the senate of Venice, over which he pretended to have a right; but it was so firmly resisted that the Pope communicated the doge and senate. He also raised forces against the republic; but by the interference of the emperor and other States, peace was restored in 1607. He embellished Rome with many excellent works of sculpture and painting, and an aqueduct. He was the founder of the Borghese family, one of the wealthiest in Italy. He died in 1621.

Paul I., Emperor of Russia; born in 1754. He was the only son of Peter III. and his wife, Catherine II. He lost his father when



PAUL I. OF RUSSIA.

eight years old, and was brought up by his mother with great harshness, and in entire seclusion from all public affairs. He married the Princess Mary of Würtemberg, in 1776, but did not escape from his solitude and rigorous treatment till, on the death of Catharine, in 1796, he was proclaimed emperor. The hopes excited by some liberal measures in the first days of his reign were soon extinguished; and with arbitrary edicts he made a complete revolution in the administration, interfering even with minute

Paul of Samosata

matters of dress and ceremony. He joined the second coalition against France; and Russian armies appeared in Italy under Suwarroff, in Switzerland, and in Holland. But he afterward withdrew from it, and entered into friendly relations with Napoleon. His rule and all his conduct grew more and more intolerable, and seemed, in fact, that of a madman. At length a conspiracy was formed against him, with Count Pahlen at its head; and he was murdered in his bedroom, March 24, 1801.

Paul, John. See WEBB, CHARLES HENRY.

Paul, St., one of the apostles of Jesus Christ; originally called Saul; a Hebrew of the tribe of Benjamin, and a native of Tarsus, the capital of Cilicia, and was born at the beginning of the Christian era. His father was a Pharisee of the most rigid cast, and Paul himself, up to the time of his conversion, was a most bitter and intolerant persecutor of the Christian sect; even assisting at the martyrdom of St. Stephen; though his life, in other respects, was blameless, and he appears to have possessed a strong and vigorous mind and resolute will, that would carry out any duty he undertook with rigid probity and energy. The mode of his conversion is fully detailed in the New Testament. After his conversion, he was baptized at Damascus by Ananias; from whence, after a brief sojourn, he proceeded to Arabia, where he is supposed to have been fully instructed in the duties and doctrines of the new faith by special revelation, and where he received the Holy Ghost in a measure equal to the other apostles. He was martyred about A. D., 66.

St. Paul, Epistles of. There are 14 epistles in the New Testament usually ascribed to Paul, beginning with that to the Romans, and ending with that to the Hebrews. Of these the first 13 have never been contested; as to the latter many good men have doubted whether Paul was the author, though the current of criticism is in favor of this opinion. These epistles, in which the principles of Christianity are developed for all periods, characters, and circumstances, are among the most important of the primitive documents of the Christian religion, even apart from their inspired character; and though they seem to have been written without special premeditation, and have reference mostly to transient circumstances and temporary relation, yet they everywhere bear the stamp of the great and original mind of the apostle.

Paul of Samosata, an heresiarch of the 3d century, who received his surname from the place of his birth, a city on the Euphrates, and became patriarch of Anti-

och in 260. Being entertained at the court of Zenobia, Queen of Syria, he endeavored to gain her to the Christian faith, by explaining away its mysteries. For this purpose, he held that Christ was a mere man, and that the Trinity consisted not of persons, but attributes. His errors were condemned by the council of Antioch, A. D., 270, and Paul was excommunicated. His disciples were called Paulinists. He lived in the 3d century.

Paul, St. Vincent de, a Roman Catholic philanthropist; born of poor parents in Southern France in 1576; was educated at Dax and Toulouse; ordained a priest in 1600; in 1605 he was captured by pirates; remained in slavery in Tunis for two years, and finally escaped to France. He afterward visited Rome, from whence he was sent on a mission to Paris, where he became almoner to Queen Margaret of Valois. In 1616 he began the labors which occupied so large a portion of his life, and which included the foundation of the institution called the "Priests of the Mission or Lazarists," the reformation of the hospitals, the institution of the Sisterhood of Charity, the instruction of idiots at his Priory of St. Lazare, etc. Among the last acts of his life was the foundation of an asylum for aged working people of both sexes, and a hospital for all the poor of Paris, which was opened in 1657. He was canonized in 1737. He died in 1660.

Paulding, James Kirke, an American author; born in Dutchess co., N. Y., Aug. 22, 1779. Self-educated, he early showed a tendency to literature, and, being a friend of Washington Irving, wrote a portion of "Salmagundi." During the War of 1812 he published the "Diverting History of John Bull and Brother Jonathan"; and in 1814 a more serious work, "The United States and England," a defense against articles in the "Quarterly Review." This gained him an appointment on the Board of Naval Commissioners. He still continued to write minor satires and humorous sketches, and in 1831 published the very successful novel, "The Dutchman's Fireside," and in 1832 "Westward Ho!" which attained to a similar popularity. These were followed by a popularly written "Life of Washington" (1835), and "Slavery in the United States" (1836), in which the institution is defended on social, economical, and physiological grounds. In 1837 Van Buren appointed him Secretary of the Navy. Four years later he retired to a country residence at Hyde Park, N. Y., where he died, April 6, 1860. The well-known patter lines, "Peter Piper picked a peck of pickled peppers," etc., occur in his satirical novel "Knoingsmarke" (1823).

Pauli, Reinhold, a German historian of England; born in Berlin, Germany, May 25, 1823, studied at Bonn, next paid a long visit for purposes of study to England and Scotland, spent the year 1848 at Oxford, and acted from 1849 till 1852 as private secretary to Bunsen. In 1855 he returned to Germany and habilitated at Bonn, whence he was called to a chair at Rostock in 1857. He obeyed a call to Tübingen in 1859, but during the war of 1866 he was punished by being sent to the little seminary at Schönthal for an article on the policy of Würtemberg in the "Preussische Jahrbücher." But he soon left this place, and was appointed to a chair at Marburg in 1867, at Göttingen in 1870. Pauli's lifelong studies were devoted to English history, and the value of his work had long been known to students before it was recognized by the D. C. L. degree conferred by Oxford in 1874. His excellent book on Alfred (1851); induced Lappenberg to commit to him the task of continuing the "History of England" in the great series of Heeren and Uckert. Pauli's part (vols. 3-5, Gotha, 1853-1858) begins with Henry II., and comes down to the accession of Henry VIII., and while portions of its ground have been more fully treated since, remains still the best history of mediæval England. Other works are "Pictures from Old England" (1860); "History of England from the Conclusion of Peace 1814-1815" (1864-1875); "Simon of Montfort" (1867); etc., besides an admirable edition of Gower's "Confession of a Lover," (3 vols. 1856). He died in Bremen, June 3, 1882.

Paulician, in Church history, a Manichæan sect of Asiatic origin, who appeared in Armenia in the 7th century. They owed their name to a mythical founder, or to their claim to a monopoly of the pure doctrine of the Apostle of the Gentiles. From the close of the 7th to the middle of the 9th century, they suffered severe persecution, notably under the regency of Theodora (841-857), who did her best to extirpate them; no less than 100,000 are said to have perished from her attempts to carry out her design.

Pauline Theology, the teaching of St. Paul as gathered from his sermons and addresses briefly reported in the Acts of the Apostles, and his Epistles. He gives prominence to the doctrine of justification by faith without the deeds of the law (Acts xiii: 39; Rom. iii: 19-31; iv: 1-25; v: 1; Gal. ii: 16; iii: 8, 24). But so states the doctrine as not to encourage sin (Rom. vi: 1-23), and of the three Christian graces he assigns the preëminence to love rendered in the authorized version charity (I Cor. xiii: 13). The Apostle of the

Paulinus

Gentiles, he contends against numerous gainsayers that the middle wall of partition between the Jews and Gentiles is broken down, both now standing on the same footing as brethren in Christ (Rom. iii: 29; Eph. ii: 11-22; iii: 1-11; Col. i: 21, 22; iii: 11). But he speaks of his countrymen with the tenderest affection (Rom. ix: 1-5). The ceremonies of the older economy he regarded as but temporary, and as standing to Christ and the newer one in the relation of a shadow to substance (Col. ii: 16, 17). These broad views rendered the apostle an object of suspicion to the Hebrew converts (Acts xxi: 20-21), and excited the most deadly animosity against him on the part of the unbelieving Jews (Acts xxii: 21-22). Baur and others of the Tübingen school consider that St. Paul, in emancipating himself from the Judaic prejudices in which the other apostles were entangled, became the real founder of Christianity as a universal religion; but Prof. Otto Pfleiderer, of Berlin, in the Hibbert Lectures for 1885, rejects this extreme view, and considers Pauline Christianity as a genuine development of the teaching of Jesus.

Paulinus, an English missionary to Northumbria, counted as the first of the archbishops of York. He was a native of Rome, and may have been named Rum before his conversion. He was sent on his mission by Gregory in 601, and first labored under Augustine in the evangelization of Kent. By him he was consecrated bishop in 625, when he accompanied Ethelburga on her marriage to the still heathen Edwin, King of Northumbria. For a long time he made no progress in his mission beyond baptizing the infant princess; but at length a great gathering was held at Goodmanham, near York, to consider the matter, and in consequence Edwin and his court submitted to baptism at York, in a wooden chapel dedicated to St. Peter, the foundation of the Minster, Easter Sunday, 627. Paulinus now carried the Gospel over Northumbria, but after six years' constant labor the death of Edwin in battle at Hatfield put a sudden end to his work. He did not wait for the honor of martyrdom, but went back with the widowed queen to Kent. In the same year he received the "pallium" as Archbishop of York from Rome, but he never returned, dying Oct. 10, 644. He was buried in the chapter house at Rochester.

Paulist Fathers, a modern American society in the Roman Catholic Church, founded in New York by the late Rev. Isaac T. Hecker, in 1858. It is composed of 37 priests who are engaged in missionary and literary work. The superior, Rev. George Deshon, is a graduate of the United States Military Academy, and a classmate of Gen.

Paulus

U. S. Grant. His predecessor in office, Rev. A. F. Hewitt, D. D., was a son of a famous Congregational minister of New England. Father Elliott was a lawyer till he became converted to the Catholic faith and took up this work. Father Young was a graduate of Princeton University and of the medical profession. In their work they adopt methods suitable to the customs of the United States, but foreign to those of the Catholic Church in general. By this they have brought upon themselves severe criticism from conservative members of the church in Europe, and are accused of "Americanism," or a desire to build up an American church. Their distinctive work is the endeavor to reach non-Catholics, and to do so they hold their meetings in the open air, or in school houses and town halls in preference to a church; they also use congregational singing, in which familiar hymns of the Protestant church are heard. From 1870 to 1899 they have given nearly 1,000 missions and have carried on a relentless warfare against the drink habit and the custom of treating in saloons.

Paulownia, a genus of trees belonging to the *Scropulariaceæ*, with but one species, *P. imperialis*, a native of Japan, and now grown in the United States. It has heart shaped leaves, and large panicles of purplish flowers. The name is derived from that of a Russian princess Paulovna.

Paulus, Heinrich Eberhardt Gottlob, a German theologian; one of the pioneers of German rationalism; born in Leonberg, near Stuttgart, Sept. 1, 1761. His father's skepticism about the resurrection was cured effectually by a promised appearance of his wife after death, and not unnaturally was succeeded by an eager belief in spiritual visions which brought about his deposition from the office of "Diakonus." The son studied at the Tübingen seminary, traveled in England, Holland, and France, and was called in 1789 to the chair of Oriental languages at Jena, which he exchanged in 1793 for that of theology. In 1803 he accepted the chair of theology at Würzburg, next filled scholastic offices at Bamberg, Nuremberg, and Ansbach, and again in 1811 accepted a chair as Professor of Church History at Heidelberg. Of his numerous works the most important were his "Life of Jesus, as the Foundation of an Original Work on Christianity" (1828); and "An Exegetical Handbook of the Three First Evangelists" (1830). His chief critical principle is an assertion of the impossibility of the supernatural, and the miracles of Christ he therefore explained as due to a variety of mistaken opinions and errors in narrating—a series of exegetical miracles postulated to get rid of the historical. Paulus lived long enough to see

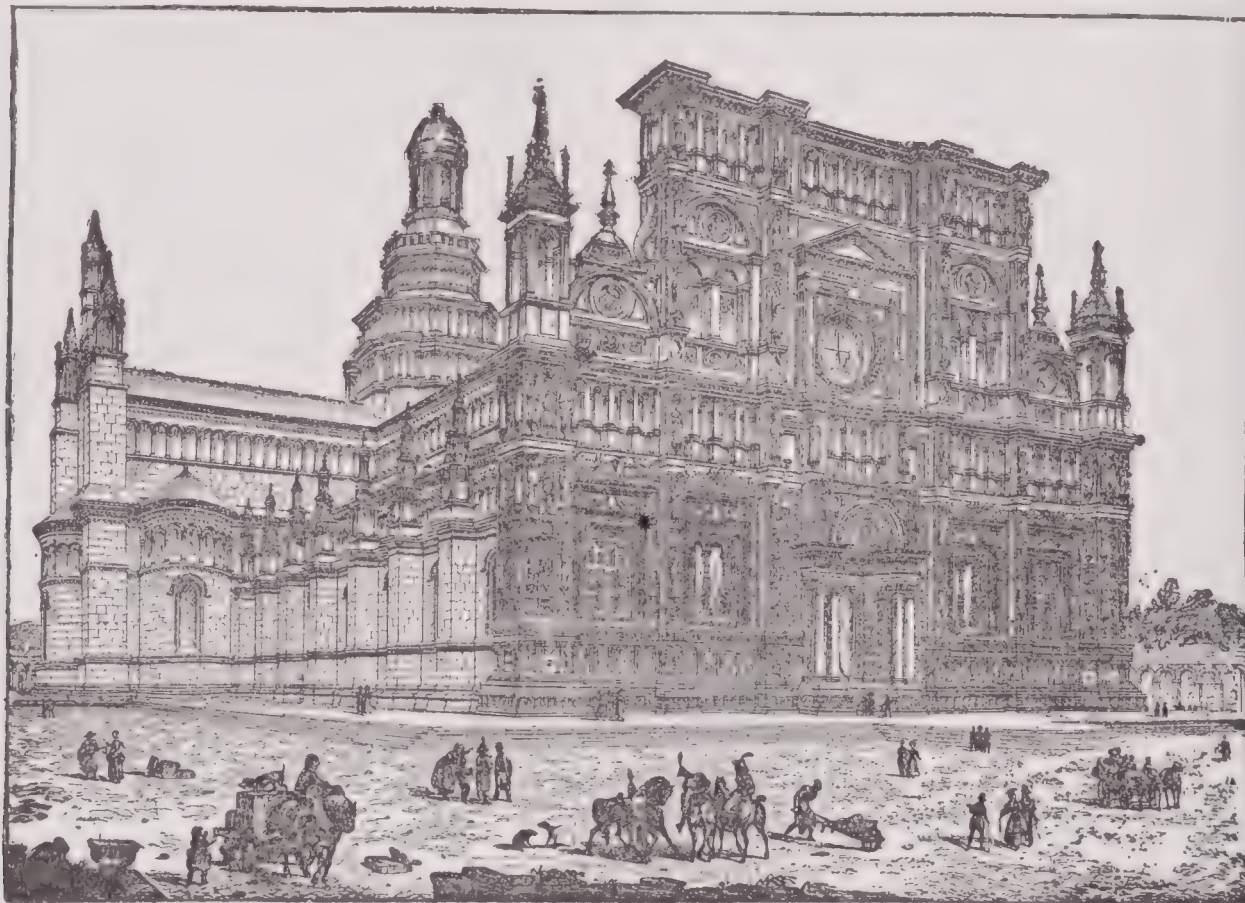
Paulus

his own rationalistic theory of Scripture give place to the more scientific mythical theory of Strauss, and that in its turn shaken to its foundation on the one hand by the Tübingen school, on the other by Neander and his school. He died in Heidelberg, Aug. 10, 1851.

Paulus, Ægineta, a celebrated Greek physician; born in the island of Ægina, and flourished most probably during the conquests of the Caliph Omar in the 7th century. Of his life we know almost nothing more than that he pursued his medical studies first at Alexandria, and afterward in Greece and other countries. He had much knowledge and skill in surgery and obstetrics, and his "Synopsis of the Medi-

Pausanias

Pauncefote, Julian, Lord, an English diplomatist; born in Preston Court, Gloucestershire, England, in 1828; was admitted to the bar, in 1852; appointed attorney-general of Hong Kong in 1865; later chief justice of the Supreme Court in the same place; and permanent under secretary of state for foreign affairs in 1882. He was the first delegate to the Suez Canal International Commission at Paris in 1885. In 1889 he was appointed British minister to the United States and four years later the legation was raised to an embassy. He negotiated the settlement of the Bering Sea dispute; the Anglo-Venezulean boundary arbitration, and other important controversies, and was chief of the British dele-



CATHEDRAL OF PAVIA.

cal Art" has gone through many editions both in its original Greek and in Latin, English, and other translations.

Paulus, Diaconus, an Italian ecclesiastic; born about 730; was educated in the court of the Lombard kings at Pavia. In 781 he was called to the court of Charlemagne, and was one of the principal instruments of the intellectual reforms effected by the emperor in the countries of Western Europe. Paulus drew up a book of homilies from the fathers, wrote a history of the bishops of Metz, and a history of the Lombards. He died about 800.

Paulus Hook, Fort, a Revolutionary fortress erected by the British on the site of Jersey City, N. J.

Paumotu. See TUAMOTU ISLANDS.

gates to the Peace Conference at The Hague in 1899. He also negotiated with the United States two conventions for the abrogation of the CLAYTON-BULWER TREATY (q. v). He died May, 24, 1902.

Pausanias, a Lacedæmonian general, nephew of Leonidas. He commanded the allied Greeks against the Persians at the battle of Plataea in 479 B. C. To himself alone he ascribed the victory, and his pretensions became insupportable when he afterward, with a combined Greek fleet, delivered Greece, Cyprus, and finally Byzantium from the Persian rule. At length he entered into secret negotiations with Xerxes, and conceived the design of making himself master of Greece. To escape arrest he sought shelter in the temple of

Athene at Sparta, where he was shut in by the enraged people and starved to death, (467 B. C.).

Pausanias, a Greek writer on mythology, history, and art who lived in the 2d century after Christ, and of whose personal history nothing is known. His "Hellas Periegesis" (Peregrination of Hellas)" is an itinerary in 10 books of his travels, which were extensive. He appears to have visited the whole of the Peloponnesus, Rome, Syria, and Palestine. He describes temples, theaters, tombs, statues, pictures, monuments of every sort. He also mentions mountains, rivers, and fountains, and the mythological stories connected with them. His observation is accurate, and his descriptions simple and reliable.

Pautet, Jules, a French publicist and poet; born in Beaune, France, in 1799. Among his writings are: "Evening Songs" (1838); "Abdul Medjid," a lyric chant (1840); "Ernest, or the Savoyard Vicar's Confession of Faith" (1858); "The Pope, Austria, and Italy" (1859); "Vercingetorix and Cæsar," a poem (1865). He died in 1870.

Pavement, the hard covering of the surface of a road or footway; a floor or covering of stones, brick, wood, etc., laid evenly on the earth, so as to form a level, hard, and convenient passage. Among the pavements now in use the most common are macadam, granite cubes, asphalt, and wood, etc. Also a decorative or ornamental flooring of colored or plain tiles, stone, or brick.

Pavia, a city of Northern Italy, capital of a province of same name, on the Ticino, 19 miles S. of Milan. Pavia possesses numerous edifices of historical and artistical interest. In the cathedral, commenced in 1848, but never finished, are the ashes of St. Augustine, in a sarcophagus ornamented with 50 *bassi-rilievi*, 95 statues, and numerous grotesques. The Certosa of Pavia, the most splendid monastery in the world, lies 4 miles N. of the city. It was founded in 1396, contains many beautiful paintings, and abounds in the richest ornamentation. The University of Pavia is said to have been founded by Charlemagne in 774, and was one of the most famous seats of learning during the Middle Ages. It consists of numerous colleges, and attached to it are a library of 120,000 volumes, a numismatic collection, anatomical, natural history, and other museums, a botanic garden, a school of fine arts, etc. The university is attended by about 1,600 students. It has numbered among its professors Alciati, Fidelfo, Spallanzani, Volta, Scarpa, Foscolo, and Monti. Manufactures silk. Here. Feb. 24, 1525, took place the

battle of Pavia (sometimes called the second battle of Marignano), in which the Imperialists, under Lanney, defeated the French, and took François I. prisoner. Pop. (1901) 35,447.

Pavilion, in architecture, a turret or small building, usually isolated, having a tent-formed roof, whence the name. A projecting part of a building, when it is carried higher than the general structure and provided with a tent-formed roof, is also called a pavilion. Applied specifically to a building erected in 1784 at Brighton for the Prince of Wales.

Pavise, a large shield covering the entire body, and carried by a soldier in the Middle Ages (hence called a *pavisor*) for his own protection, as well as that of the archer before whom he stationed himself. They were often six feet or more in height.

Pavonia, a name formerly used to designate a region extending from Hudson co., N. J., to Perth Amboy. The name still survives in several places of local importance.

Pawl, or **Paul**, a pivoted bar adapted to fall into the notches or teeth of a wheel as it rotates in one direction, and to restrain it from back motion. Used in windlasses, capstans, and similar machinery. The pawl acts by gravitation or by a spring.

Pawnbroker, one who is licensed to lend, or make a business of lending money on goods pawned or pledged. The Emperor Augustus Cæsar, 31, B. C., instituted a fund for lending to needy persons on pledge. The institutions, called "Monti di Pietà," arose at Perugia, in Italy, about A. D. 1462. The first pawnbrokers in England were Lombards, and the three balls still used as their insignia are said to have been derived from the arms of the Medici family, adopted, according to legend, in memory of Averardo de Medici, a commander under Charlemagne, who slew a giant and kept his mace or club, with three balls at the top, as a trophy. Laws regulating pawnbroking are in force in each of the United States.

Pawnees, a tribe of American Indians who formerly resided in Nebraska, with branches extending into Kansas and Texas. They surrendered their lands S. of the Platte by treaty in 1833; suffered much thereafter at the hands of their hereditary enemies, the Sioux; and in 1876 removed, only 2,026 strong, to a reservation of 283,020 acres in Indian Territory. In 1887 they numbered only 918. In 1899 their number had decreased to 706.

Pawtucket, a city in Providence co., R. I., on the Pawtucket river, at the head of navigation, and on the New York and New

Pax

England, and the New York, New Haven and Hartford railroads; 4 miles N. of Providence. The river here falls 50 feet, and this fact, with its proximity to the sea, led Samuel Slater in 1790 to select it as the site for the first cotton factory built in the United States. Here are water-works, public library, public and parochial schools, street railroad and electric light plants, National and savings banks, and several daily and weekly newspapers. It has about 400 manufacturing establishments, representing over 70 industries of which the most important are cotton, woolen, and hair cloth mills, machine shops, and foundries, print works, and extensive thread mills. The assessed property valuation exceeds \$34,600,000. Pop. (1890) 27,631 (1900) 39,331; (1910) 51,622.

Pax, in Church history, the kiss of peace. In the early Church the Roman *osculum* was adopted and raised to a spiritual significance (Rom. xvi: 16; I Cor. xvi: 20; II Cor. xiii: 12; I Thess. v: 26). To obviate possible danger from this custom, the Apostolic Constitutions strictly decreed the separation of the sexes at public worship. The pax was given at mass in the Western Churches till the 13th century, when Archbishop Walter in 1250 introduced the metal pax, and its use spread to the Continent. The pax is now only given at high masses, and the formal embrace substituted for the kiss is confined to those in the sanctuary. Also an osculatorium; at first probably a crucifix, then a plate of metal adorned with a figure of Christ crucified, or some other pious picture or emblem, passed among the congregation to be kissed as a substitute for the actual kiss of peace. Its use is almost entirely confined to religious houses and seminaries. Called also Instrumentum, Tabella Pacis, Pacificale, and Freda.

To give the pax, to exchange the formal embrace now substituted for the kiss of peace. In the Roman High Mass at the *Agnus Dei*, the celebrant (having received the pax from the bishop, if he be present) gives it to the deacon, who gives it to the subdeacons, who give it to the assisting clergy. The hands of the giver and receiver of the pax are placed lightly on each other's shoulders, they bow, and the giver says "Pax tecum" (Peace be with thee).

Pax, the Roman goddess of peace.

Paxo, one of the Ionian Islands, lies S. E. of Corfu, has with the smaller island of Antipaxo (1 square mile), an area of 8½ square miles. Pop. 5,000, and produces wine, olives and olive oil, almonds, oranges, lemons, etc. Capital, Gaïon, the seat of a bishop.

Paxton, Sir Joseph, an English architect and horticulturist; born in Milton-

Paymaster-General

Bryant, near Woburn, Bedfordshire, Aug. 3, 1803. He began life as a gardener in the service of the Duke of Devonshire, at Chiswick, and was thence transferred to Chatsworth; there he was put in charge of the gardens, and entirely remodelled them, and was made manager of the duke's Derbyshire estates. The experience he obtained in designing capacious glass conservatories at Chatsworth found wider scope in his proposals for a palace of glass and iron for the Great Exhibition of 1851. It was the first time these materials had been employed on so extensive a scale, and visitors found an inexhaustible theme of admiration in a fairy palace so novel, beautiful, and magnificent. His design obtained for him the honor of knighthood. He then designed the Crystal Palace at Sydenham and superintended its construction from the materials of the exhibition in Hyde Park. He also laid out the terraces, and planned the gardens, with their fountains, cascades, etc. Besides publishing a very popular "Cottage Calendar," he edited the "Botanical Magazine," "Paxton's Flower-Garden, Pocket Botanical Dictionary," and other works. He died in Sydenham, June 8, 1865.

Paxwax, a name given by butchers to the strong stiff tendons running along each side of the neck of large quadrupeds to the middle of the back. It diminishes the muscular effort necessary to support the head in a horizontal position.

Payaguas, an Indian tribe of Paraguay, now numbering only a few hundred, who live in the Chaco region near Asuncion. They are very dark in color and are of a low grade of savages, living in the swamps and subsisting on fish and alligators.

Paymaster, an officer in the army and navy, from whom the officers and men receive their wages, and who is intrusted with money for that purpose. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment; but in regard to the immediate duties of his office he is directly responsible to the war office. The paymaster of a ship in the navy has a general charge of the financial department in the vessel.

Paymaster-General, in the United States, a title given to (1) the chief paying officer of the War Department, who ranks as a Brigadier-General; (2) a similar officer in the Navy Department, who ranks as a rear-admiral, and (3) a corresponding staff officer in the militia of a State. In Great Britain the paymaster-general is a government officer whose duties were formerly limited to the army, but who now acts as paymaster-general of all the services. Formerly it was a lucrative,

Payn

but is now an unpaid office. The paymaster-general is *ex officio* a privy counselor.

Payn, James, an English novelist; born in Cheltenham, England, in 1830; was graduated at Cambridge in 1854, beginning at once a notable literary career. From 1858 he edited "Chambers' Journal," for which he wrote exclusively for many years. In 1882 he became editor of the "Cornhill Magazine." His works reach upward of 100 books, the best known being: "Lost Sir Massingberd" (1864); "By Proxy" (1878); "The Luck of the Darrells" (1885); "The Talk of the Town" (1885); "Some Literary Recollections" (1886); "Gleams of Memory" (autobiographical, 1894); "The Disappearance of George Driffeld" (1896); and "Another's Burdens" (1897). He died in London, March 25, 1898.

Payne, Henry Clay, an American jurist; born in Ashfield, Mass., Nov. 23, 1843; was graduated at Shelburne Falls Academy (Mass.) in 1859; settled in Milwaukee, Wis., in 1863; was for several years chairman of the Republican State Central Committee, and became a member of the Republican National Committee in 1880. In 1888 and 1892 he was delegate to the Republican national conventions, and in 1896 as vice-chairman of the national committee directed the Republican campaign in the Western States. From Jan. 8, 1902, to his death, he was postmaster-general of the United States. He was interested in public service corporations in Wisconsin, held the presidency of the American Street Railway Association in 1893-94, and in 1893-95 was receiver of the Northern Pacific railroad. He died at Washington, D. C., Oct. 4, 1904.

Payne, John, an English poet and Oriental scholar; born in London, Aug. 23, 1842. He studied for the bar, and in 1867 became a solicitor. Among his works are: "The Masque of Shadow" (1870); "Intaglios" (1871); "Songs of Life and Death" (1872); "Lautrec" (1878); a translation of the "Poems of Francis Villon" (1878); "New Poems" (1880); "Francis Villon—a Biographical Study" (1881); a close and scholarly translation of the "Arabian Nights" (1882-84), and a rendering of the "Rubáiyát" (1898).

Payne, John Howard, an American dramatist; born in New York, June 9, 1792. At the age of 16 he made his first appearance at the Park Theater in the character of Young Norval with brilliant success and fulfilled a number of engagements in other cities as "the American juvenile wonder," etc. He also played in England and Ireland, a part of the time with Miss O'Neill. He visited London in 1813 and there founded a theatrical journal called "The Opera Glass." In 1832 he retired from the stage and in 1851 was

Peabody

appointed United States consul to Tunis. He wrote, translated and adapted over 60 plays, but is most famous as the author of "Home, Sweet Home," originally in the opera of "Clari." He died in Tunis, April 10, 1852. In 1883 his remains were removed to the United States and interred in Oak Hill cemetery, near Washington, D. C.

Paysandú (pī-san-dōō'), a town and port of Uruguay, capital of Paysandú department; situated on the E. bank of the Uruguay river, 280 miles N. W. of Montevideo. It is a busy port, and contains large slaughter houses, etc. Tinned meat, especially tongues, is exported. Pop. (1898) 26,000.

Paz Soldan, Mariano Felipe (päth söl-dän'), a Peruvian historian; born in Arequipa, Peru, in August, 1821. He was director of public works, twice minister of justice and the author of "Geographical Atlas of Peru" (1861); "History of Independent Peru" (1866); "Dictionary of the Argentine Republic" (1884); "History of the War of the Pacific" (1884); etc. During the Chilean occupation he was exiled to Buenos Ayres. He died in Lima, Dec. 31, 1886.

Pea, *Pisum sativum*, an annual with a rounded stem, many alternate compound leaflets, two stipules larger than the leaflets, and tendrils at the extremity of the stems or branches. Peduncle axillary, one or more commonly two flowered; flowers white or pale violet; legumes oblong or scimiter shaped, pendulous. It is believed that the pea is a native of Southern Europe. It has run into many varieties. Green peas are a luxury; dried or split ones are used for soups; or, ground into meal, may be used for puddings. The field-pea (*P. arvense*) is cultivated in the northern United States and in Canada, and both straw and grain are fed to stock. The everlasting pea (*q. v.*) and the sweet pea (*q. v.*) belong to the genus *Lathyrus*, and the chick-pea (*q. v.*) is a species of the genus *Cicer*.

Peabody, a town in Essex co., Mass.; on the Boston and Maine railroad; 2 miles E. of Salem. It comprises North Peabody, South Peabody, West Peabody, and a number of other villages. Here are the Peabody Institute and Library, the Sutton Reference Library, a high school, and National and savings banks. It has manufactures of leather, morocco, sheep skin, boots and shoes, woolen goods, electric supplies, thermometers, etc., and an assessed property valuation of over \$8,000,000. Prior to 1868 the town was called South Danvers; and was then named Peabody in honor of George Peabody, who was born here. Pop. (1890) 10,158; (1900) 11,523; (1910) 15,721.

Peabody, Elizabeth Palmer, an American writer and educator; born in Billerica, Mass., May 16, 1804. She became a teacher in Boston in 1822; and was one of the

first to introduce the kindergarten system in the United States. Besides contributions to periodicals she published: "First Steps to History" (1833); "Æsthetic Papers" (1849); "The Polish-American System of Chronology" (1852); "Chronological History of the United States" (1856); "Reminiscences of Dr. Channing" (1880); "Letters to Kindergartners" (1886); and "The Last Evening with Allston, and Other Papers" (1887). She died in Jamaica Plain, Mass., Jan. 4, 1894.

Peabody, George, an American philanthropist; born in Danvers, Mass., in 1795. He was descended from an English family, and his parents being poor, George received but a scanty education, becoming grocer's clerk at the age of 11. Displaying excellent business qualities, he became chief clerk, and, afterward, partner with his uncle, John Peabody, in Georgetown, D. C., in 1812. Not satisfied, however, with their business relations, George left his uncle and joined partnership with Mr. Elisha Riggs in the drygoods business in Baltimore, in 1815. His business increasing, he found occasion to make frequent visits to England, where he finally settled in 1829, having previously become the head of the firm by the retirement of Mr. Riggs. In 1837 he withdrew from the firm, and established himself as banker in London, where he amassed a fortune which enabled him to fully carry out his benevolent ideas. He was particularly devoted to promoting education. Commencing with his native place of Danvers, Mass., where he bestowed \$270,000 for the cause of education, his purse was always open to assist the good work, not only in the land of his birth, but throughout the world. To the city of Baltimore he donated for this purpose the sum of \$1,400,000; to the Board of Trustees for the promotion of education in the South, he gave \$3,500,000; besides other munificent donations throughout the country. In 1862 he established a Board of Trustees for the amelioration of the condition of the poor of London, to which he contributed at various times the amount of \$2,500,000, having the satisfaction of seeing his plans in successful operation before his death in London, in November, 1869. After his decease, his remains were, by command of Queen Victoria, temporarily interred in the royal vault in Westminster Abbey, and, subsequently, conveyed with state by the British ship of war "Monarch," escorted by an American war-steamer, to the United States, to be finally deposited, amid imposing manifestations of international respect, at Danvers (now Peabody), Mass., in March, 1870.

Peabody, Education Fund. In 1867 and 1869 George Peabody established a fund of \$3,500,000, to be devoted to education in the Southern States of the Union. Of this

amount \$1,380,000 being in Mississippi and Florida bonds was not available, those of Mississippi having been repudiated and those of Florida issued while it was a territory, never having been recognized as legal by its authorities. The fund was placed in the charge and control of 15 trustees, of whom Mr. Robert C. Winthrop, of Massachusetts, was the chairman. Mr. Peabody died in London, in 1869. The trustees hold meetings annually, usually in New York. They fill vacancies caused by death or resignation. Prof. Wickliffe Rose is general agent of the fund, with headquarters at Nashville, Tenn., and has charge of the distribution of the fund in the several Southern States. In its earlier history the chief aim of the fund was to encourage and secure the establishment of public school systems for the free education of all children. That having been accomplished, the income of the fund was for some years used for the training of teachers through normal schools and teachers' institutes, and later in aid of normal schools and in an improved supervision of rural schools. At its session in October, 1896, the board declared it to be inexpedient to close the trust in February, 1897, the power to do which was left to its discretion; but in 1905 it was decided to dissolve it, and out of the balance on hand to appropriate \$1,000,000 to the Peabody College for Teachers, affiliated with the University of Tennessee at Nashville, to be used in preparing teachers for the Southern States. On Jan. 1, 1910, the trustees of the fund arranged to convey their appropriation to the officers of the College for Teachers in view of the fact that the prescribed conditions, namely, that the State of Tennessee, the city of Nashville, and Davidson County should donate the sum of \$500,000, had been fulfilled. This appropriation left about \$1,500,000 for further distribution, probably among small colleges in the South.

Peace, a state of quiet or tranquillity; freedom from or absence of disturbance, agitation, or disorder; as freedom or exemption from war or hostilities; absence of civil or foreign strife, contention, or quarrel.

Peace, Religious, the name given in German history to a series of treaties by which, after the Reformation, the Protestant states were secured in the exercise of their religion. There were two treaties which especially bear this name, that of Nuremberg in 1532, and that of Augsburg in 1555.

Peace Conference. After the secession of several of the States of the American Union in 1860, Virginia, on Jan. 1, 1861, invited the remaining States to send delegates to a conference in Washington, with the object of devising a plan whereby all difficulties then existing might be peaceably settled. The conference met on Feb. 4. Fourteen free States and seven slave States

were represented, and ex-President John Tyler was made the presiding officer. A committee of one from each State was appointed to draw up a report of "what they may deem right, necessary and proper, to restore harmony and preserve the Union." Several minority reports were presented, but the majority report was adopted. It recommended a number of amendments to the Constitution, the substance of which was as follows: 1. In the territories N. of lat. 36° 30' slavery was to be prohibited. In territories S. of that line the institution was to remain as it then was, and no law was to be passed abridging the right of a man to take his slave thither. The status of new States was to be determined by the constitution adopted by them. 2. No new territory was to be acquired except by discovery or for naval and commercial stations or depots, without the concurrence of a majority of the Senators from the free States and a majority of the Senators from the slave States. 3. Neither the Constitution nor any amendment thereof was to be construed as giving Congress power to interfere with slavery in any State; nor to abolish it in the District of Columbia without the consent of the State of Maryland and of the owners, nor without compensation to the latter; nor to prohibit representatives and others from taking their slaves to the district and bringing them away again; nor to prohibit slavery in any place under the jurisdiction of the United States, if within a slave State; nor to prohibit the inland slave trade between slave States, but not in or through free States. The slave trade in the district was prohibited. Section 4 provided for the delivery of fugitive slaves, section 5 for the prohibition of the foreign slave trade, section 7 for the payment to owners by the United States of the value of slaves that might escape by reason of the interference of mobs with federal officers, and for "securing to the citizens of each State the privileges and immunities of citizens in the several States," while section 6 ordained that sections 1, 3 and 5 and Article 1, section 2, clause 3, and Article 4, section 2, clause 3, of the Constitution were to be amended or abolished only by the unanimous consent of the States. This report was offered to the Senate, which refused to act upon it, and it met a similar fate in the House, neither party being satisfied with it.

Peace Congress, Universal, an international gathering at The Hague, held in response to an invitation of Nicholas II., Czar of Russia, beginning May 18, 1899. It was received with every mark of attention by the government of the Netherlands, and was organized, as by previous understanding, with M. de Staal, the Russian ambassador to England, as president. The nations represented were the six great European pow-

ers, some eight smaller European States, four Asiatic governments, and the United States. The European States were Russia, England, France, Germany, Austria, Italy, Holland, Belgium, Denmark, Sweden and Norway, Switzerland, Spain, Portugal, Serbia, Rumania, and Turkey. The four Asiatic were China, Japan, Persia, and Siam. Bulgaria desired an invitation, but Turkey's nominal suzerainty stood in the way. Montenegro was represented by Russia. Three committees were constituted: 1. On Armaments; 2. On Rules of War; 3. On Arbitration. These were subsequently divided into sections to which separate subjects were referred. On following days presidents and vice-presidents of the committees were chosen. The sections met and considered their subjects and reported to the committees. These in turn accepted or rejected the results of the sections and reported to the conference, which acted upon their conclusions.

The results of the conference were not as satisfactory as its promoters had hoped. The most important was based on the report of the third committee, which was accepted by the conference after several modifications—a treaty which, when ratified by the Senate of the United States, constitutes and establishes a court for the arbitration of disputes between nations. In reference to armaments, the opinion of the conference was expressed in the following words: "The conference considers that the limitation of military charges, weighing upon the world at the present time, is greatly to be desired in the interest of an increase of the material and moral welfare of humanity," and also, "The conference is of the opinion that the governments—taking into account the propositions made in this conference—should make a study of the possibility of an agreement concerning the limitation of armed forces on land and sea and of naval budgets." In the revision of the laws of war, the following results, among others, were reached: The absolute prohibition of pillage and of the destruction or confiscation of works of art; an elaborate and humane system of regulations concerning the rights, duties, and privileges of prisoners of war; the extension of the Geneva Red Cross rules to naval warfare; the adoption and extension of the laws formulated by the Brussels conference for the conduct of land warfare. The proposition of the American delegates that private property, not contraband of war, shall be excepted from capture on the high seas, was not adopted. Declarations were made against asphyxiating shells (rejected by the United States and England) and expanding bullets (rejected by England). A second conference was held from June 15 to Oct. 18, 1907. A resolution favoring compulsory arbitration was adopted.

Peace Protocol

Peace Protocol. The steps leading to the negotiations for peace between Spain and the United States were stated by President McKinley in his message to Congress Dec. 5, 1898.

The protocol was as follows:

"Article I. Spain will relinquish all claim of sovereignty over and title to Cuba.

"Art. II. Spain will cede to the United States the island of Porto Rico and other islands now under Spanish sovereignty in the West Indies, and also an island in the Ladrones, to be selected by the United States.

"Art. III. The United States will occupy and hold the city, bay, and harbor of Manila, pending the conclusion of a treaty of peace, which shall determine the control, disposition, and government of the Philippines.

"Art. IV. Spain will immediately evacuate Cuba, Porto Rico, and other islands now under Spanish sovereignty in the West Indies, and to this end each government will, within 10 days after the signing of this protocol, appoint commissioners, and the commissioners so appointed shall, within 30 days after the signing of this protocol, meet at Havana for the purpose of arranging and carrying out the details of the aforesaid evacuation of Cuba and the adjacent islands.

"Art. V. The United States and Spain will each appoint not more than five commissioners to treat of peace, and the commissioners so appointed shall meet at Paris not later than Oct. 1, 1898, and proceed to the negotiation and conclusion of a treaty of peace, which treaty shall be subject to ratification according to the respective constitutional forms of the two countries.

"Art. VI. Upon the conclusion and signing of this protocol hostilities between the two countries shall be suspended, and notice to that effect shall be given as soon as possible by each government to the commanders of its military and naval forces."

President McKinley issued his proclamation Aug. 12, 1898, declaring on the part of the United States a suspension of hostilities and commanding that orders be immediately given through the proper channels to the commanders of the military and naval forces of the United States to abstain from all acts inconsistent with the proclamation.

Under the protocol the following military commissions were appointed: For Cuba: American, Maj.-Gen. James F. Wade, Rear-Admiral William T. Sampson, Maj.-Gen. Matthew C. Butler; Spanish, Maj.-Gen. Gonzales Parrado, Rear-Admiral Pastor y Landero, Marquis Montero; For Porto Rico: American, Maj.-Gen. John R. Brooke, Rear-Admiral Winfield S. Schley, Maj.-Gen. William W. Gordon; Spanish, Maj.-Gen. Ortego

Peace Relations of the Nations

y Diaz, Commodore Vallarino y Carrasco, Judge Advocate Sanchez del Aguila y Leon. The United States appointed the following commissioners to negotiate a treaty of peace: President, William R. Day, Secretary of State; Senator Cushman K. Davis, Minnesota; Senator William P. Frye, Maine; Senator George Gray, Delaware; and Whitelaw Reid, ex-Minister to France. Spain appointed: President, Eugenio Montero Rios, president of the Senate; Senator Buenaventura de Abarzuza; Judge José de Garnica; Wenceslao R. de Villa Urrutia, and Gen. Rafael Cerero.

Peace Relations of the Nations. One of the most interesting questions at the beginning of the new century is a comparison of the relations toward one another of the great European nations now, with the relations which existed when the 18th century came to its end. Such a comparison helps one to realize the nature of the changes which have passed, not only upon Europe as a whole, but also upon the character of national life and national self-consciousness in each of the nations. When the 19th century began, national feeling had in each nation far less to do with the policy of the State than it has now. Policy, especially foreign policy, was practically left to the ruler; and the ruler, though he might sometimes be influenced by popular sentiment, or might defer to it, was mostly guided by his own dynastic interests.

It was only in England that any government we should now call a free government existed. Even in England the king had a great deal of power and the borough-holding oligarchy had much more. Still in England there was a distinct national feeling, and it was hostile to the French. France, under the Republic and Napoleon, returned the hatred. The mutual dislike of Frenchmen and Germans was much less strong. So, too, was that of Frenchmen and Spaniards, though both sentiments did exist as the natural fruit of former wars. Elsewhere there were hardly any national animosities. Italy did not exist as a political community; and the Italians had so little sense of unity as a people that they could have but little common aversion to any other people. In Germany most of the princes groveled before Napoleon, and were glad to profit by his favor.

During the first half of the century the feeling of nationality grew apace. It was awakened by the example of France and by the conquering career of Napoleon, who trampled on the other nations till they turned and overthrew him. The new passion for German national union dates from the great rising against the French in 1813. France evoked the spirit which was destined ultimately to weld Germany together for the tremendous struggle of 1870. So it

was first the French and then the Austrian occupation of Italy that gave birth to the movement which in Italy was at the same time and in the same minds a struggle for political freedom and a struggle for political unification. The foreigner was the hindrance to both, so the Italians drew themselves together into one for the expulsion of the foreign tyrants.

The sense of an even more cruel oppression made the Greeks into a nation out of a mixed race of Hellenes, Albanians, and Slavs. Russia was still far back in darkness, and though the branches of the Russian race were united by devotion to the czar and the orthodox faith, the feeling of nationality in the modern meaning of the term did not develop itself in her till our own time. Meanwhile the example of Italy and Germany had been telling on the smaller peoples. It has worked in Rumania, in Servia, in Bulgaria, among the Germans of Schleswig-Holstein; in the Austrian empire; even in Iceland, not to speak of Ireland where it had of course long existed, though it grew much faster in the second quarter of the century under Daniel O'Connell and the repeal agitation.

The principle of nationality, defeated after a severe struggle in 1849, triumphed in Italy in 1859-1870, and in Germany in 1866-1871, and since then has prevailed in the smaller countries of Southeastern Europe which have been freed from Turkish rule. National sentiment is now powerful all over Europe, and powerfully affects the policy of all the great States. It used to be believed that its victory would usher in a period of peace and of freedom, because when each nationality had reached its natural territorial limits, a dangerous source of quarrels between States would have been removed. Stability having been attained, good feeling would follow. So, too, Cobden and thinkers of his school expected that free trade, whose general acceptance they deemed certain, would also make strongly for peace, because each nation, perceiving the benefits of unrestricted commercial intercourse, would feel that peace would promote its material interests. So, further, everyone expected that as people became better educated, more free and more enlightened, they would renounce war, "the old game of monarchs," seeing how much happier and more prosperous they would be under a system of pacific industrialism.

But new forces came into play. National sentiment, in rendering each nation more proud of itself, made it more jealous of its neighbors, more eager to strengthen itself at their expense. That sort of ambition which had formerly animated monarchs, now spread through the body of the people. Free trade did not extend its dominion from England over continental Europe. On the contrary, the producers and manufac-

turers of the Continent conceived their interests to lie in imposing protective tariffs. Commerce between different countries did indeed increase vastly, and goes on increasing as population grows, and as scientific discovery stimulates industrial production. But so also does the competition increase between the manufacturers and exporters in different countries; and this competition has led not only to much ill feeling between the competing countries, but also to a race for the acquisition of new territories outside Europe which are to be turned into markets for the exports of the States that can appropriate them.

As commerce has in some instances embittered the relations of nations, so even popular government has disclosed new methods by which they may be embittered for the selfish ends of ministers or politicians. A government which finds itself in domestic difficulties owing to the resistance of a party in its own country, may be tempted to plunge into a foreign war in order to distract attention from its own shortcomings or rally the nation to its support. Louis Napoleon played this desperate game, to his own undoing, in 1870. Even Bismarck did not scruple to use foreign policy as a counter in the game of foreign politics; and in other countries, less dominated by the government than Germany was under Bismarck, the same expedient has been resorted to.

Each people knows far more about other peoples than it did 100 years ago. Each has far better means of following the political life of the others. This we owe partly to facilities of communication, partly to the newspapers and the habit of reading which has increased their circulation and which they in turn have stimulated. But the newspapers have been by no means an unmixed blessing. It would be nearer the truth to say that they have become a fertile source of international misunderstandings and dislikes. It is easier to attack another country than to praise it, and it makes better "copy," just as personal gossip is in private conversation more frequently malicious than kindly. That the press of France, Germany, and England has done much to embitter the relations of these three great countries is a complaint frequently heard from European statesmen. Lord Salisbury has more than once dwelt upon it.

Against these untoward influences there are to be set three influences which have worked for good during the last half century. One is the aversion to war of the magnates of commerce and finance. Sometimes, of course, they expect to gain by strife or the prospect of it; but far more frequently they stand to lose. Their power, which is great and growing, is usually thrown into the scale of peace. The second

Peace Society

wholesome tendency is that of the men of thought and learning and science, who in most countries, and conspicuously in France and Italy, feel so warm a sympathy with their fellow students and fellow workers in other nations that they do what they can to promote good feeling and discountenance war.

Lastly there is the tendency to solidarity among the Socialists and so-called Laborists all over Europe. The leaders of the Social Democratic movement, desiring to overthrow what they call the domination of soldiers and capitalists, and desiring to unite the working classes in every country for this purpose, see their nearest and most formidable antagonists in international jealousies and in the system of vast standing armies. Their whole weight is usually thrown into the scale of peace. Even in England, where this movement has been much less strong than in France or Germany, the Socialist party has been almost unanimous in its protest against the South African War.

Coming back to our starting point of a comparison between the friendliness of international relations in Europe now, with the state of things in 1800, it must be admitted that there is much cause for disappointment. In few departments of the life of the world has this century, so amazingly fertile in progress, been able to record so little progress. There is nothing that deserves to be called friendship between any two nations, for the effusive sentiments of France toward Russia are not very warmly reciprocated by the Russians. The legal and formal relations of States are better than they were in the last century, but there is probably as much jealousy and suspicion now as then. Yet after all, things are better than they were in the days of Napoleon. The doctrines of statesmen and the practice of States still lay far behind the ideals which were deemed so near of attainment 40 years ago. But these ideals seem to be more and more making their way, however slowly, among the masses of the people. JAMES BRYCE.

Peace Society, The, an organization founded in 1816; has for its object the promotion of permanent and universal peace. It welcomes the support of Christians of all denominations, and also of those persons who oppose war on humanitarian or other grounds. The society has always advocated a gradual, proportionate, and simultaneous disarmament by all the nations of Europe, and the principle of arbitration, and it is unquestionably due to its efforts that this mode of settling international difficulties has been adopted with increasing frequency and acceptance. During the period of its existence over 140 instances of pacific settlements have occurred. The society maintains a constant propaganda in favor of

Peace Treaties

peace, and among other methods of action especially advocates the preaching of sermons on the subject of peace, in as many churches as possible, on the Sunday before Christmas.

Peace Treaties. Peace treaties of the present time are very different from those of the days of Cæsar, when the capture and death or condemnation to slavery of the leader of the conquered army was the usual method of ending the war. After the battles of sea and land are fought then come those of diplomacy, a keen contest between the statesmen of the contending nations, each striving to obtain or retain advantages. Nearly every treaty that has been concluded during the last five centuries has been attended by the same procedure. First there is a cessation of hostilities. Then comes the protocol or a preliminary peace. This provides the general terms on which the war is ended. Commissioners are then appointed by the opposing nations, who meet and arrange terms for the treaty, which is written and signed by them. It must then be ratified by the legislature of each of the countries represented. The protocol between the United States and Spain was signed Aug. 12, 1898. In September a commission of five was sent to Paris, where they were met by a similar number of representatives of Spain. The treaty was signed Dec. 10, 1898, and was transmitted to the United States Senate Jan. 4, 1899. It was formally ratified by the Senate Feb. 6; and was signed by President McKinley Feb. 10, and by the Queen Regent of Spain March 17. See PEACE PROTOCOL.

Among the most noted peace treaties are those of Westphalia, Oct. 24, 1648, which closed the 30 years' war; peace of the Pyrenees, Nov. 7, 1659, ending the 20 years' war between France and Spain; the treaty of Utrecht, ending the 14 years' war of the Spanish-Succession; that of Aix-la-Chapelle, which brought about the end of the war of the Austrian Succession; the treaty of Paris, 1783, by which the boundaries between the British and American possessions in America were determined; the treaty of Ghent, which defined the boundary line between the United States and Canada; the Congress of Vienna, in 1815, which was a meeting of dictators for arranging the affairs of Europe according to their views; the treaty between the United States and Mexico in 1848; the treaty of Paris, March 30, 1856, following the Crimean War; that between France and Germany, in 1871, which ended the Franco-Prussian War; the treaty of Berlin between Turkey and Russia; the treaty of 1895 between Japan and China, the result of the war between those countries; and the treaty between Greece and Turkey, signed at Constantinople, Dec. 24, 1897, by which the Greco-Turkish War was

ended, Greece agreeing to pay an indemnity of about \$15,000,000 and submit to a strategic reconstruction of the frontier in Turkey's favor.

Peach, the delicious fruit of *Amygdalus Persica*, the peach tree, genus *Amygdalus*. It is distinguished by oblongo lanceolate serrulate leaves; solitary flowers, of a delicate pink color, appearing before the leaves; and the sarcocarp of the drupe succulent and tender, not fibrous as in the almond. Many varieties are cultivated in the United States, and form an important branch of commerce, chiefly in Pennsylvania, Maryland, New Jersey, Delaware, Western New York, and Southern Illinois, which possess extensive orchards, sometimes containing no less than 20,000 trees.

Peacock, any individual of the genus *Pavo*, specifically, the common peacock (*P. cristatus*), a native of India, domesticated in Great Britain. The plumage is extremely gorgeous. Head, neck, and breast rich purple, with gold and green reflections; back green, feathers scale-like, with coppery edges; wings, inner coverts, and shoulders, white, striated with black; middle coverts deep blue, primaries and tail chestnut, abdomen black; train chiefly green, beautifully ocellated. Crest of about 24 feathers, webbed only at tip; green, with blue and gold reflections. Bill and legs horny brown. Length to end of tail about four feet, and the train measures about as much more. The peahen is chestnut-brown about the head and nape; breast and neck greenish, edged with pale whity-brown; upper plumage light brown, with faint wavings, increased on upper tail coverts; tail deep brown with whitish tips; abdomen white; lower parts and under tail coverts brown. Length 38 to 40 inches; crest shorter and duller than in the male. Among the Greeks and Romans the peacock was sacred to Hera or Juno. By the epicures of the Italian peninsula its flesh was esteemed a dainty. Quintus Hortensius (born 119 B. C.) was the first to serve up peacocks at table, at the supper which he gave on entering on the office of augur. The proverbial reproach "vain as a peacock," is scarcely well founded, for the bird is no vainer than other birds in the love season, and the display of his train is intended to attract the attention of the hen bird.

Peacock, Thomas Love, an English writer; born in 1785. His first important work was a novel entitled "Headlong Hall," published in 1815, and this was followed by "Melincourt," "Nightmare Abbey," "Maid Marian," the "Misfortunes of Elphin," "Crotchet Castle," "Gryll Grange," and a poem called "Rhododaphne." He was the friend and executor of Shelly, and was connected with the East India Office for nearly 40 years. He died in 1866.

Peacock Butterfly, the *Vanessa io*, a beautiful butterfly, two and one-half, or two and three-quarter inches across the wings which are a dull, deep red, each with an eye-like spot. Larva spiny, black, with many white dots. It is seen in numbers on the tops of nettles, in June and July. The perfect insect appears in August, lives through the winter, and is seen in March and April.

Peacock Stone, the name under which the dry cartilaginous ligaments of some large lamellibranchiate mollusks, as the pearl oyster, have been sold by jewelers.

Pea Crab, a small brachyurous crustacean of the genus *Pinnotheres*, which lives in the shells of oysters, mussels, and other bivalves. Two or three species are met with in the United States.

Peake, Richard Brinsley, an English dramatist; born in London, England, Feb. 19, 1792. Among his plays are: "Amateurs and Actors," a musical farce (1818); "The Duel, or my Two Nephews" (1823); "Presumption, or the Fate of Frankenstein" (1824); "Comfortable Lodgings, or Paris in 1750" (1827); "Before Breakfast" (1828); "The Title Deeds," a three-act comedy in prose (1847). He died Oct. 4, 1847.

Peale, Charles Willson, an American miscellaneous writer; born in Maryland, April 16, 1741. He attained distinction as a portrait painter, and also as a naturalist. He wrote: "Essay on Building Wooden Bridges" (1797); "Discourse Introductory to a Course of Lectures on Natural History" (1800); "Domestic Happiness" (1816). He died in Philadelphia, Feb. 22, 1827.

Peale, Rembrandt, an American artist; born in Bucks co., Pa., Feb. 22, 1778. When 17 years old executed a portrait of Washington, from whom he had three sittings. He painted portraits of many distinguished men. He was president of the American Academy, and also one of the original members of the Academy of Design. His portrait of Washington (1823) was purchased by Congress. He died in Philadelphia, Pa., Oct. 3, 1860.

Peanut, the pod of the *Arachis hypogæa*. The plant is an annual of diffuse habit, with hairy stem, with two paired, abruptly pinnate leaflets. The flowers above ground are sterile, and the pods or legumes are stalked, oblong, cylindrical, and about one inch in length, the thin reticulated shell containing one or two irregularly ovoid seeds. After the flower withers, the stalk of the ovary has the peculiarity of elongating and bending down, forcing the young pod under ground, and thus the seeds become matured at some distance below the surface. As to the native country

of the peanut the opinions of botanists are divided between Africa and America. It is extensively cultivated in all tropical and subtropical countries, especially in America, Africa, India, the Malayan Archipelago, and China. The plant affects a light sandy soil, and is very prolific, yielding sometimes 30 to 40 bushels of nuts per acre. The pods when ripe are dug up and dried. When roasted they are sweet and palatable. Large quantities of peanuts are consumed in various parts of the world. By expression the nuts yield a large quantity of oil, which forms an excellent substitute for olive oil. The peanut crop in the United States in 1897 amounted to 2,600,000 bushels.

Pear, the *Pyrus communis*. It is a shrub or small tree, 20 to 40 feet high, with the branches more or less spinescent and pendulous, the flowers in corymbose cymes, and the fruit pyriform, one or two inches long, becoming larger and sweeter in cultivation. Many hundred cultivated varieties exist. The wood of the pear is almost as hard as box, and is sometimes used as a substitute for it by wood engravers.

Peard, Frances Mary, an English novelist; born in Exminster, Devon, in 1835. Among her numerous novels and historical romances, which were popular both in England and the United States, are: "Unawares" (1870); "The Rose-Garden" (1872); "Thorpe Regis" (1874); "Cartouche" (1878); "Schloss and Town" (1882); "The Asheldon School-Room" (1883); "Prentice Hugh" (1887); "The Blue Dragon"; "The Interloper."

Pea Ridge, a post village in Benton co., Ark.; about 8 miles E. of Bentonville. Here, on March 6, 7, and 8, 1862, occurred one of the most desperate battles of the Civil War. Gen. Samuel B. Curtis, in command of about 11,000 Union troops, with 49 pieces of artillery, was attacked by a superior force of Confederates (said to number 20,000) under Gen. Earl Van Dorn, and a series of obstinate and sanguinary conflicts ensued; which lasting through three days, often favoring each army with temporary success, finally ended with the withdrawal of Van Dorn. The total Union loss was 1,351; that of the Confederates, though never officially reported, is supposed to have been more severe.

Pearl, a peculiar product of certain marine and freshwater mollusks or shellfish. Most of the molluscous animals which are aquatic and reside in shells are provided with a fluid secretion with which they line their shells, and give to the otherwise harsh granular material of which the shell is formed a beautifully smooth surface, which prevents any unpleasant friction upon the extremely tender body of the animal. This secretion is evidently laid in extremely thin

semitransparent films, which, in consequence of such an arrangement, have generally a beautiful iridescence, and form in some species a sufficient thickness to be cut into useful and ornamental articles. The material itself in its hardened condition is called nacre by zoölogists, and by dealers mother-of-pearl. Besides the pearly lining of the shells, detached and generally spherical or rounded portions of the nacre are often found on opening the shells, and there is great reason to suppose these are the result of accidental causes, such as the intrusion of a grain of sand or other substance, which, by irritating the tender body of the animal, obliges it in self-defense to cover the cause of offense which it has no power to remove; and as the secretion goes on regularly to supply the growth and wear of the shell the included body constantly gets its share, and thereby continues to increase in size till it becomes a pearl. The most famous pearls are those from the East; the coast of Ceylon or Taprobane, as it was called by the Greeks, having from the earliest times been the chief locality for pearl fishing. They are, however, obtained now of nearly the same quality in other parts of the world, as Panama in South America, St. Margarita in the West Indies, the Coromandel coast, the shores of the Sooloo Islands, the Bahrien Islands, and the islands of Karak and Corgo in the Persian Gulf. The pearls of the Bahrien fishery are said to be even finer than those of Ceylon, and they form an important part of the trade of Bassora.

These, and indeed all the foreign pearls used in jewelry, are produced by the pearl oyster. The single pearl which Cleopatra is said to have dissolved and swallowed was valued at \$400,000, and one of the same value was cut into two pieces for earrings for the statue of Venus in the Pantheon at Rome. Coming down to the later times, we read of a pearl in Queen Elizabeth's reign, belonging to Sir Thomas Gresham, which was valued at \$75,000, and which he is said to have treated after the fashion of Cleopatra; for he powdered it and drank it in a glass of wine to the health of the queen, in order to astonish the ambassador of Spain, with whom he had laid a wager that he would give a more costly dinner than could the Spaniard. False pearls are very admirable imitations, made by blowing very thin beads or bulbs of glass, and pouring into them a mixture of liquid ammonia and the white matter from the scales of the bleak, and sometimes of the roach and dace. The proper way to prepare the pearl matter is first to remove the scales of the lower part of the fish; these must then be very carefully washed, after which they are put to soak in water, when the pearly film falls off and forms a sediment at the bottom of the vessel, which

Pearl Ash

is removed and placed in liquid ammonia for future use. Roman pearls differ from other artificial pearls by having the coating of pearly matter on the outside, to which it is attached by an adhesive substance. The art of making these was derived from the Chinese.

The Chinese have long been in the habit of introducing grains of sand and little knots of wire into the shell of the pearl oyster, in order that the animal, to relieve itself from the irritation so caused, may coat the foreign substance with pearl. If this matter be inserted between the shell and the mantle, the oyster can eject it by contractions of his body. To prevent this, M. Boulan, a French experimenter, has trepanned the shell and introduced a small bead of nacre, which might, however, be a true pearl of small size, through the hole and fixed it by means of cement to the shell. This bead was, in course of time, covered with nacre by the oyster and a fine large pearl, which could not be distinguished from one from the Orient, was the result. It is said that two years is required to produce a big pearl. An artificial pearl could be coated in the same way.

Pearl Ash, crude carbonate of potash, obtained from the ashes of plants by dissolving the calcined mass in water, decanting the clear solution, and evaporating it to dryness in flat iron pans. By constant stirring toward the end of the process, the pearl ash is obtained in a semigranular state. It is very impure, containing variable quantities of potassic silicate, sulphate, chloride, etc.

Pearl Harbor, a United States coaling station at the island of Oahu, Hawaii; acquired prior to the annexation of the islands.

Pearl of the Antilles, Cuba.

Pearl Stone, a felspathic mineral, consisting of silicate of aluminium with varying quantities of iron, lime, and alkalies; it occurs in spherules, which have a pearly luster.

Pearly Nautilus, the *Nautilus pompilius*; common in the Pacific and Indian Oceans, especially toward the Molluccas. It is believed to inhabit both deep and shallow water. Belon figured its shell, and then Rumphius; and on Aug. 24, 1829, Mr. George Bennett captured a specimen in Marakini Bay on the S. W. side of Erromango. The soft parts were elaborately described by Professor Owen. The shell is imported into Europe for its fine mother-of-pearl, much in request with cabinet makers and jewelers. The smallest and most excavated partitions are used to make pendants for the ear. By removing the external layer of the shell which is not nacreous,

Peary

drinking vessels of great brilliancy are made in the East, as they formerly were also in Europe.

Pearson, John Loughborough, an English architect; born in Brussels, Belgium, July 15, 1817; became best known as a restorer of cathedrals. He restored Bristol, Lincoln, Rochester, and Chichester cathedrals, and was consulting architect for the cathedrals of Gloucester and Exeter. He planned the alterations at Westminster Hall, finished in 1884. His most famous work was the restoration of the decaying portions of Westminster Abbey. He also planned the gigantic Truro Cathedral, the best-known of modern European cathedrals. The founder of the modern school of Gothic architecture, he introduced many original ideas and devices into the art. He died in London, England, Dec. 11, 1897. His grave is in Westminster Abbey.

Pearsons, Daniel Kimball, an American philanthropist; born in Bedford, Vt., April 14, 1820; was graduated at the Medical College of Woodstock, Vt.; practised medicine till 1857; then became successively a farmer in Illinois, real estate agent in Chicago, and director of the Chicago City Railway Company, and other corporations. In 1888, he retired from business and devoted himself to philanthropic enterprises. Between 1890 and 1910 Dr. Pearsons gave away over \$5,000,000 to 47 colleges. In 1909 he gave \$1,000,000 to Chicago institutions. His gifts usually carried the stipulation that the corporation should also raise a certain sum in a given time.

Peary, Robert Edwin, an Arctic explorer and civil engineer in the United States navy; born in Cresson, Pa., May 6, 1856; was graduated at Bowdoin College, and in 1885 became a civil engineer in the United States navy, with the rank of lieutenant. In 1886 he made a journey of reconnoissance to Greenland, advancing for over 100 miles on the interior ice. In 1891 and 1893 he made other trips to the Polar regions, in which he was accompanied, as far as the winter quarters, by his wife, Josephine Diebitsch Peary, author of "My Arctic Journey." In these expeditions he made excursions on a sledge along the coast of Greenland, and traversed the inland ice from McCormick Bay to the N. E. angle of Greenland (Independence Bay). He proved the convergence of the E. and W. coasts of Northern Greenland, and almost with positiveness the insularity of the mainland. He discovered new lands (Melville Land and Heilprin Land), and named many glaciers. In May, 1896, Lieutenant Peary made a successful expedition to Greenland for the purpose of collecting specimens in natural history. He returned to Cape Breton, Sept. 27. In 1897 he was given leave of absence by the government

for the purpose of continuing his explorations in the northern seas, and to establish a station in the far N. of Greenland, which should be provisioned and supplied and made the basis of a series of annual expeditions into the Polar regions. In pursuance of this project he went N. in the summer of 1897 to take the necessary preliminary measures, such as securing the aid of the Eskimos, fixing the site of a station, etc. He returned in October of that year, bringing with him an immense mass of meteoric iron, or what is supposed to be such, from Cape York, Greenland, which was placed in the Museum of Natural History in New York city. On July 3, 1898, Lieutenant Peary again sailed on a search for the North Pole, going in the steamer "Hope" from St. John's, Newfoundland, to Sidney, Cape Breton, and from there to Cape York, Baffin's Bay. At that place the party and stores were transferred to the "Windward," a stout vessel which has made a number of Arctic voyages. In September, 1901, word was received from Peary that he had rounded the Greenland archipelago (the extreme N. land known), and reached lat. $83^{\circ} 39' N.$ In the spring of 1902 he left Cape Hecla, on the N. coast of Grant Land, in an attempt to reach the North Pole over the frozen Arctic seas. He reached lat. $84^{\circ} 17' N.$, beyond which the polar pack prevented his advance. In 1906, in the "Roosevelt," he reached lat. $87^{\circ} 6' N.$, and planted the American flag 203 miles from the Pole. On July 6, 1908, Peary again started in the "Roosevelt," and on Sept. 6, 1909, telegraphed from Indian Harbor, Labrador, that he had reached the Pole on April 6, preceding. In 1911 Congress authorized his promotion to rear-admiral on the retired list.

Peasant Proprietorship, a system of cultivation of small holdings of land by occupiers who own the land, or hold it on some secure or permanent tenure.

Arthur Young held that the best system of agriculture was that which secured the largest amount of produce from the land. It is evident, however, that another consideration of great importance must be taken into account—viz., the numbers, quality, and condition of those engaged in tilling the soil. Though nations might attain to brilliant positions by trade, commerce, and the accumulation of wealth, yet the permanent strength, the solidity, and resisting power of a country must closely depend on the number and condition of its rural population. Hence if it could be proved that vast areas of land could be cultivated at the greatest money profit, by means of machinery and a handful of laborers, yet such a method of cultivation would be adverse to the real interests of the nation as a whole.

The system develops a handiness, a fer-

tility of resources, an adaptation of means to ends, and an incessant industry, qualities hardly to be expected in connection with hired labor. As owner of his little holding the peasant proprietor has no restrictions as to cropping or methods of cultivation. He has no doubts about compensation for unexhausted manures and improvements, and no uncertainty as to tenure. The great secret of success of peasant proprietorship is summed up by Adam Smith in a striking passage in his "Wealth of Nations": "A small proprietor who knows every part of his little territory, who views it with all the affection which property, especially small property, naturally inspires, and who on that account takes pleasure not only in cultivating but in adorning it, is generally of all improvers the most industrious, the most intelligent, and the most successful." The two drawbacks of peasant proprietorship are excessive subdivision and the unlimited power of mortgage.

Peasants' War, a struggle called the "Bundschuhe," which broke out in 1502, and another, the War of Poor Conrad, in Würtemberg, in 1514. The peasants of the small towns rebelled in Swabia, and those of the Thurgau rose in arms in June, 1524, when many outrages were committed. After a temporary lull it broke out again early in 1525, on a more extended scale, the peasants of Alsace, Franconia, Lorraine, the Palatinate, and Swabia joining in the movement. They published a manifesto containing their demands, embodied in 12 articles. The insurgents, after some successes, were defeated by the army of the Archduke Ferdinand, May 2; again at Königshofen, June 2; and were put down after 100,000 persons had perished, in June, 1525. The Anabaptists took part in the movement.

Pea Stone, or **Pisolite**, a limestone rock, composed of globules of limestone about the size of a pea, usually formed round a minute grain of sand or other foreign body, and joined with a cement of lime. In pisolitic rocks belonging to the Oölitic period ironstone is frequently found.

Peat, a deposit formed in bogs by the decay of vegetable matter, frequently consisting almost entirely of sphagnum, or bog moss. In composition it differs from coal only in the relative proportion of its constituents. Thus, peat contains: Carbon, 55.62; hydrogen, 6.88; oxygen and nitrogen, 37.50; while coal consists of: Carbon, 88 to 94 per cent.; hydrogen, 2.5–5.5; oxygen, 2.5–6.0. It forms extensive deposits in various parts of Northern Europe, and notably in parts of Ireland, where it is commonly known as turf, and is largely used as fuel.

Peattie, Mrs. Elia Wilkinson, an American journalist; born in Michigan, in

Peba

1862; connected with the Chicago press. Her works include: "The Judge," a novel (1891); "With Scrip and Staff," a story of the Children's Crusade (1891); "A Mountain Woman, and Other Stories" (1896).

Peba, *Dasypus (Tatusia) peba*, called also the black tatou, an armadillo ranging from Texas S. to Paraguay. The ears are large, long, and close together; the head small, long, and straight; mouth large. Scales hexagonal; the bands vary in number, increasing with the age of the animal. It is nocturnal, swift of foot, and a good burrower. Its flesh is said to resemble sucking pig in flavor, and the native women attribute imaginary virtues to the shell.

Pebble, or **Pebblestone**, a name given to roundish nodules and geodes, especially of siliceous minerals, such as rock crystal, agate, etc.; but commonly and more correctly applied to small fragments of rocks and minerals which have become rounded and water worn, like the shingle forming the beach on a seashore. Thus, pebbles may be composed of any rock or mineral; as, for example, of sandstone, quartz, limestone, flint, etc. When of considerable size, they are called boulders, or boulder stones. Pebbles of gold are known by the name of nuggets or pepitas. In a technical sense, the term pebble, among opticians, generally means the transparent and colorless rock crystal or quartz (pure silica) which is used as a substitute for glass in spectacles; its extreme hardness renders it more durable, and less liable to become scratched.

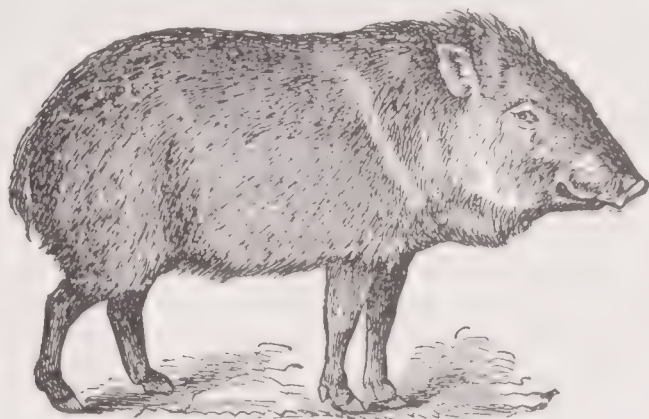
Pébrine, a French name for a destructive epizootic disease among silkworms due to internal parasites, which swarm in the blood and all the tissues of the body, passing into the undeveloped eggs of the females, so that it is hereditary, but only on the side of the mother. It is contagious and infectious, the parastic corpuscles passing from the bodies of the diseased caterpillars into the alimentary canal of healthy silkworms in their neighborhood.

Pecan, or **Pecan Nut**, a species of hickory (*Carya olivæformis*) and its fruit, growing in North America. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers. The nut has a thin yellowish-brown shell, and is of a sweet and agreeable flavor. Pecan nut oil is used as a substitute for olive oil.

Peccary, the popular name for two species of small suilline mammals from the New World, so nearly allied that they breed freely in captivity, but never produce more than two at a birth. The collared peccary (*Dicotyles torquatus*) ranges from Arkansas S. to the Rio Negro, and seldom attacks other animals. The white-lipped peccary

Peck

(*D. labiatus*) is rarely met with N. of British Honduras, or S. of Paraguay. It associates in large droves, is very pugnacious, and does not hesitate to attack man. The hunter who encounters a herd of this spe-



PECCARY.

cies has often to take to a tree for safety. Both are omnivorous, and possess a gland in the middle of the back, secreting a musky substance, which taints the meat if not speedily removed after death. By some old travelers this gland was mistaken for a second navel, a circumstance which influenced Cuvier in selecting the generic name.

Pechili, Gulf of, a land-locked extension of the Yellow Sea, between the base of the Korean peninsula and the Chinese province of Shan-tung, into which the Pei-ho discharges.

Peck, a dry measure of two gallons, or eight quarts, for grain, pulse, etc.; the fourth part of a bushel. So, a great deal, number, or quantity.

Peck, George Wilbur, an American humorist; born in Henderson, N. Y., Sept. 28, 1840. He was at one time mayor of Milwaukee, and governor of Wisconsin, in 1891-1895. In 1883 he published "Peck's Bad Boy and his Pa," a humorous book which attained immediate popularity and was subsequently successfully dramatized. His other works include: "A Compendium of Fun" (1883); "How Private George W. Peck Put Down the Rebellion" (1887); etc.

Peck, Harry Thurston, an American critic; born in Stamford, Conn., Nov. 24, 1856; was graduated at Columbia University, was Professor of Latin Language and Literature there in 1888-1910; and in 1895-1907 was the American editor of the "Bookman." Among his works are: "The Semitic Theory of Creation" (1886); "Suetonius" (1889); "Latin Pronunciation" (1890); "Dictionary of Classical Antiquities and Literature" (1897); etc.

Peck, Samuel Minturn, an American poet; born in Tuscaloosa, Ala., in 1854. He was educated at the University of Alabama, and later studied medicine in New York. Among his works are: "Cap and

Bells" (1886); "Rings and Love Knots" (1892); "Rhymes and Roses"; "Fair Women of Today"; etc.

Peckham, John, an English mediæval theologian; Archbishop of Canterbury; died in 1292. He was a voluminous writer on theological and scientific subjects. Among his works are: "Common Perspective"; "Theory of Planets." In verse he wrote: "The Nightingale, Harbinger of Pleasant Weather"; "Defense of the Mendicant Friars."

Pecopteris, the name given to a genus of fossil ferns occurring in the coal measures, New Red Sandstone, and Oölite, from the comb-like arrangement of its leaflets.

Pecos River, a river of New Mexico and Texas, which has a S. E. course of about 800 miles, and falls into the Rio Grande del Norte, but in summer is generally dry.

Pecquet, Jean, a French physician; born in Dieppe about 1620; studied medicine, and especially anatomy, at Montpellier. He discovered and demonstrated the course of the lacteal vessels in the human body. He died in 1674.

Pecten, in zoölogy and palæontology, scallop; a genus of *Ostreidæ*, sometimes made the type of a distinct family, *Pectinidæ*. Shell sub-orbicular, regular, usually with radiating ribs, beaks approximate, eared, the anterior ones most prominent, the posterior ones a little oblique. Animal with a row of ocelli and delicate crescentic gills. Distribution world-wide; known recent species, 176, fossil (including *Aviculopecten*), 450; from the Carboniferous onward.

Pectinibranchiata, those gasteropods having pectinated branchiæ or gills, as the purple shells (*Murex*), whelk (*Buccinum*), cowries (*Cypræa*), etc.

Pectolite, a hydrated silicate of lime and soda, which occurs in white or grayish spheroidal masses, composed of an aggregate of acicular crystals, or of delicate fibers, arranged in a radiated or stellar form.

Peculiar, exclusive property or right; that which belongs exclusively to one. In English canon law, a particular parish or church, having jurisdiction within itself, and exempt from that of the ordinary or bishop's court. Peculiars are divided into royal (as chapels royal), of which the king is ordinary, and peculiars of archbishops, bishops, deans, chapters, prebendaries, etc. Court of peculiars in English canon law, a branch of the Court of Arches having jurisdiction over all the parishes dispersed throughout the province of Canterbury, in the midst of other dioceses, which are ex-

empt from the ordinary jurisdiction, and subject to the metropolitan alone.

Peculiar People, a Protestant sect of recent origin, found mostly in Kent, England, and to a less degree in other counties round London. They recognize no sacraments or creeds, and claim to be the real exemplars of true and undefiled religion. They accept the exhortation of St. James (v: 14, 15) in a strictly literal sense, and this has more than once led to a verdict of manslaughter being returned against some of their members by a coroner's jury. The analogue of this sect in the United States is to be found in the Faith Curists. The name apparently has reference to I Pet. ii: 9.

Peculium, in Roman law, private, exclusive, or separate property, more especially the property which a son or a slave might acquire independent of the control of his father or his master. Hence, a particular fund for one's own private needs or uses.

Pecuniary Causes, in English law, causes arising either from the withholding of ecclesiastical dues, or the doing or neglecting to do some act relating to the Church, whereby the plaintiff suffers damage, toward satisfying which he is permitted to institute a suit in the spiritual court.

Pedagogue, in classical antiquity, a slave who led his master's children to school, places of amusement, etc., till they became old enough to take care of themselves. In many cases the pedagogues acted also as teachers. A teacher of young children; a schoolmaster. (Used generally in contempt or ridicule.)

Pedal, a projecting piece of metal or wood which is to be acted upon or pressed down with the foot; a treadle; as, the pedal of a bicycle. In musical instruments, a part acted on by the feet. (1) On the pianoforte there are usually two pedals, one of which enables the performer to play only on one string, the other to remove the dampers. (2) On the organ there are combination pedals, which alter the arrangement of the registers, and a swell pedal, by which the swell shutters are opened and closed, and (3) a pedal clavier or keyboard, on which the feet play. (4) On the harp there are pedals, each of which has the power of flattening, sharpening, or making natural, one note throughout the whole compass of the instrument. Also, a fixed or stationary bass; a pedal bass, pedal note, or pedal point, over which various harmonies or contrapuntal devices are constructed; they chiefly occur in fugues.

Pedee, Great, or Yadkin, a river rising in Caldwell co., N. C., and flowing a general N. E. course to Stokes county, turns to the

S. E., and following this direction rather tortuously, receiving several small tributaries on its way, it enters South Carolina, and takes the name of Great Pedee. Thence S. S. E. through this State, it enters the Atlantic Ocean by Winyaw Bay in Georgetown district. LITTLE PEDEE rises in Richmond co., N. C., and flowing S. by E. into South Carolina, enters the main stream from Horry county.

Pedersen, Christiern, a Danish scholar and historical writer; born about 1480, at Svendborg on the island of Fynen; was an ardent reformer. By his translation of Luther's Bible—the "Bible of Christian III.," so called—he contributed largely to the formation of the literary language of Denmark. He wrote several historical works, and translated the "Danish History" of Saxo Grammaticus. He died in 1554.

Pedestal, an insulated basement or support for a column, a statue, or a vase; the lower member of a pillar, named by the Greeks stylobates and stereobates. In classical architecture it consists of three divisions: The base, or foot next the ground, the dado, forming the main body, and the cornice, or sur-base molding, at the top. In machinery, the standards of a pillow block, holding the brasses in which the shaft turns. In railway, a casting secured to the truck-frame and having vertical guides for the journal-boxes of the axles, which rise and fall in the pedestals as the springs collapse and expand.

Pedetes, a genus of rodent mammals, of the mouse family, of which the best-known species is *P. capensis* (the jumping hare of South Africa).

Pedicel, in botany, the stalk that supports one flower only where there are several on a peduncle. Any short and small footstalk, though it does not stand upon another footstalk, is likewise called a pedicel.

Pedicellariæ, very remarkable minute structures on the skin of sea urchins and starfish, having the form of a stalk with a three-bladed or two-bladed snapping forceps at the summit. They take hold of algæ preparatory to the application of the suckorial feet, and probably help likewise to keep the surface of the echinoderm clean.

Pedicularis, the lousewort; a genus of *Euphrasiæ*. Herbs parasitic upon roots; calyx somewhat leafy, inflated, five cleft, or unequally two or three-lobed, jagged; upper lip of the corolla laterally compressed, and the lower one plane, three-lobed; stamens didynamous; ovules many; capsule compressed, two-celled; seeds angular. Known species more than 100. The genus occurs in the Pleistocene.

Pedigree, an account of lineage through its different steps or degrees; line of ances-

tors from which a person, family, or tribe descends; descent; lineage; genealogy; an account or register of a line of ancestors; a genealogical chart.

Pedilanthus, a genus of *Euphorbiacæ*. A decoction of *P. tithymaloides* and *P. padifolius* (the Jewbush) is given in India in syphilis and amenorrhœa. The root is emetic. The species were originally from America.

Pediment, the triangular plane or surface formed by the vertical termination of a roof consisting of two sloping sides. The pediment is bounded by three cornices, viz., a horizontal one, beneath it, forming its base, and two sloping or raking ones, as they are technically termed. Besides sculpture within them, pediments are frequently surmounted at their angles and apex with low pedestals, upon which statuary is placed. In Italian, and modern architecture generally, the pediment is employed as a mere decoration for the dressings of both doors and windows. Pediments are generally placed only over the windows of the principal floor of a building. Window pediments are either angular or curved (*i. e.*, segmental), and both forms are frequently introduced together.

Pedipalpi, in zoölogy, an order of Arachnida, corresponding to Huxley's *Arthrogastera*. It contains two families, *Scorpionidæ* and *Phrynidæ*. It dates from the coal measures onward.

Pedometer, a pace measurer; an instrument to count the steps. Small pedometers, to be worn on the person, consist of a train of wheels in a small case, and a dial which registers the number of impulses derived from a cord attached to the foot. In this form it becomes a register of the number of paces.

Pedro I., Dom Antonio José D'Alcantara, Emperor of Brazil, eldest son of John VI., King of Portugal, elder brother of Don Miguel, and nephew to Ferdinand VII., King of Spain; born in 1798, and was taken, in 1808, with the rest of the royal family, to Brazil. In 1822, the Brazilians having proclaimed their independence, chose Pedro for their emperor. The death of John VI., in 1826, left Don Pedro the crown of Portugal; he soon afterward established a liberal government in that country, and granted it a charter. After abdicating the crown of Portugal in favor of his daughter, Donna Maria, he nominated his brother, Don Miguel, regent; but scarcely had he quitted Portugal, than Don Miguel took possession of the throne. In 1831 he was compelled to abdicate the throne of Brazil in favor of his son, Don Pedro II. Returning to Europe, he raised troops in France and England, with which he, in 1833, drove Don Miguel from the

Pedro II.

throne of Portugal, and placed the crown upon the head of his daughter. He was twice married; his first wife being Maria Leopoldina, Archduchess of Austria, and the second, Amelia, daughter of Prince Eugène de Beauharnais. He died in 1834.

Pedro II., Emperor of Brazil; born in Rio Janeiro, in 1825; succeeded to the throne on the abdication of his father, Dom Pedro I., in 1831; and married the Princess Theresa Christina Maria (died 1890), sister of Francis I., King of Naples, in 1843. Brazil prospered greatly under the rule of Pedro II., who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. He made several visits to Europe; assisted President Grant in opening the Centennial Exposition in Philadelphia in 1876; and was deposed by the revolution of November, 1889. He died in 1891.

Pedro V., King of Portugal; born in 1837, was the son of Donna Maria II. and Fernando of Saxe-Coburg-Gotha, king-consort. He ascended the throne in 1855, and died in 1861.

Pedro The Cruel, King of Castile and Leon; born in 1334. He succeeded his father, Alfonso XI., in 1350, and in 1353 married Blanche de Bourbon, sister of the King of France, but in three days deserted her, and devoted himself to his mistress, Donna Maria Padilla. Subsequently he poisoned his queen, and cruelly persecuted members of his own family and Castilian grandees, till an insurrection was raised against him under the lead of Harry of Trastamara, who finally defeated and slew him in the battle of Montiel, March 14, 1369.

Peebles, James Martin, an American physician; born in Whittingham, Vt., March 23, 1822; was graduated at the Pennsylvania University of Medicine and Surgery; was president of the California College of Science for four years; and professor in the Eclectic Medical College at Cincinnati, O., for three years. He was a member of the Northwest Congressional Indian Peace Commission in 1868; United States consul to Trebizonde, Turkey, in 1869; and represented the United States Arbitration League at the International Peace Conference in Berlin. He was a Fellow of the Academy of Arts and Sciences at Naples, and other important foreign societies. At different times he edited and owned several newspapers and three times made a tour of the world, lecturing on medical subjects. He wrote "The Christ Question Settled" (1897); "Death Defeated" (1900); and several medical works.

Peel

Peebles, Mrs. Mary Louise (Parma-lee), "LYNDE PALMER," an American author; born in Lansingburg, N. Y., Dec. 10, 1833. Among her books are: "The Little Captain" (1861); "Helps over Hard Places" (1862); "The Good Fight" (1865); "The Honorable Club" (1867); "Drifting and Steering" (1867); "Archie's Shadow" (1869); "Jeannette's Cisterns" (1882); "Where Honor Leads" (1894); etc.

Peekskill, a village in Westchester co., N. Y.; on the Hudson river, and on the New York Central and Hudson River railroad; 42 miles N. of New York. It is noted for the picturesque mountain scenery which surrounds it. The town contains a military academy, St. Gabriel's School, Helping Hand Hospital, Field Library, Mohegan Lake School; the New York State Military Camp, House of Good Shepherd, waterworks, gas, and electric lights, and several weekly newspapers. It has manufactories of fire brick, stoves, foundry facings, underwear, and hats, and an assessed property valuation of over \$5,500,000. Pop. (1890) 9,676; (1900) 10,358; (1910) 15,245.

Peel, a fortified tower; a fortress, a fort. They were constructed generally of earth and timber, strengthened by palisades. Peels are frequent on the Scotch border, and were formerly used as residences for the chiefs of the smaller septs, and as places of defense against marauders.

Peel, Arthur Wellesley, an English statesman; youngest son of Sir Robert Peel; born in 1829. He was educated at Eton and Oxford; entered Parliament as member for Warwick and Leamington in 1865; was parliamentary secretary to the Poor-law Board (1868-1871); secretary to the Board of Trade (1871-1873); patronage secretary to the treasury (1873-1874); under-secretary for the Home Department (1880); and on the retirement of Sir Henry Brand (Viscount Hampden) in 1884, became speaker of the House of Commons. He was created 1st Viscount Peel in 1895.

Peel, Sir Robert, an English statesman, son of Sir Robert Peel, a wealthy manufacturer; born in 1788, and studied at Harrow and Oxford. When just 21 years of age he entered Parliament, and thenceforth the sphere of his exertions and triumphs was in the House of Commons, in the history of which his career will form a large feature. He was no orator, nor was he, properly speaking, a natural and simple debater. His manner was the artificial one of thorough training, and the House from his practice got to like it, though to a stranger it was generally unpleasant. He could state his case clearly and forcibly, but he seldom liked to abandon a subject till he had discussed it at

great length. In 1811 he was made under-secretary for the colonies, and in 1812, when only 24, he received the very responsible appointment of chief secretary for Ireland. After carrying his celebrated currency measure of 1819, he became, in 1822, home secretary. Refusing to take office under Canning, he joined the ministry of the Duke of Wellington in 1828. Here, by conceding Catholic emancipation (against which he had previously protested), he did one of those acts which have been called tergiversation by some, and the result of honest conviction, rising above original prepossession, by others. He still, however, professed to belong to the Conservative party, and he became a strenuous opponent of Earl Grey's ministry, and the Reform Bill. When a Conservative government was, from mere accidental and personal causes not well explained, established in 1834, he gallantly undertook the attempt to work it, though conscious that the task was hopeless. He became prime minister in 1841, with better prospects. The position in which he was placed was that of the head of a protectionist government, established to defeat and suppress the free trade party. As circumstances developed themselves in the few critical years from 1841 to 1846, some indications of opinion created alarm among the thorough protectionists, and it was seen that the prime minister, becoming convinced of the truth of free trade, was determined to carry its principles into practice. After the repeal of the Corn Laws and other measures in the same spirit, he resigned office to a party to whom his later opinions legitimately belonged, in the summer of 1846. He died in 1850, of internal injuries caused by a fall from a horse.

Peele, John Thomas, an American artist; born in Petersborough, England, in 1822; settled in New York city in 1835; early manifested a genius for portrait painting and went to Europe to study; returned to New York in 1846, and studied in the National Academy of Design, of which he became an Associate. Later, he devoted himself to genre painting, becoming a specialist in studies of child life. His chief productions include "Children in the Wood" (1847); the "Girl and Kitten"; "Sunny Days of Childhood"; "Jennie's Pet"; "Music of the Reeds"; "Grandma's First Lesson in Knitting"; "Asleep on Duty"; "The Wealth of Wild Flowers"; "The Little Laundress"; "Recitation for Grandpa"; "The Bird's Nest" (1885); etc. He died in 1897.

Peeping Tom. See KETTELL, SAMUEL.

Peep-o'-day Boys, the name given to those insurgents who appeared in Ireland in 1784, shortly after the volunteer movement. They were so named from visiting

the houses of the "defenders," their antagonists, at daybreak in search of arms.

Peepul, or **Pipal** (*Ficus religiosa*), also known as the SACRED FIG of India, and in Ceylon called the Bo-TREE, a species of fig, somewhat resembling the banyan, but the branches not rooting like those of that tree, and the leaves heart-shaped with long attenuated points. The tree is held sacred by the Hindus, because Vishnu is said to have been born under it. It is generally planted near temples, and religious devotees spend their lives under its shade. It is also held sacred by the Buddhists of Ceylon. It attains a great size and age. The peepul is often planted near houses, and by the sides of walks, for the sake of its grateful shade. The juice contains a kind of caoutchouc, and is used by women as bandoline. Lac insects feed upon this tree, and much lac is obtained from it. The fruit is not much larger than a grape, and though eatable is not valued.

Peer, in general, an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Great Britain a member of one of the five degrees of nobility that constitute the "peerage" (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords. The dignity and privileges of peers originated with the growth of the feudal system, the peers being originally the chief vassals holding fiefs directly from the crown, and having, in virtue of their position, the hereditary right of acting as royal counsellors. Subsequently not all the crown vassals appeared at court as advisers of the king, but only those who were summoned to appear by writ. This custom grew at length into a rule, and these summonses were considered proofs of hereditary peerage. Latterly the honor of the peerage has been exclusively conferred by patent. As regards their privileges all peers are on a perfect equality. The chief privileges are those of a seat in the House of Lords, of a trial by persons of noble birth in case of indictments for treason and felony, and misprision thereof, and of exemption from arrest in civil cases. The British peerage collectively consist of peers of England, of Scotland, of Great Britain, of Ireland, and of the United Kingdom, but only a portion of the Scotch and Irish peers are peers of Parliament.

Peet, Stephen Denison, an American clergyman and archæologist; born in Euclid, O., Dec. 2, 1830. He became a Congregational minister, and an authority on the works of the mound builders and American archæology in general. Among his works are: "Ancient Architecture in America" (1884); "Picture Writing" (1885); "The

Pegasus

Effigy Mounds of Wisconsin (1888); **"Prehistoric America"** (1890-1895).

Pegasus, in astronomy, the Flying Horse; one of the 20 ancient N. constellations, bounded on the N. by Lacerta and Andromeda, on the S. by Aquarius, on the E. by Pisces, and on the W. by Equuleus and Delphinus. It is on the meridian in September at midnight. Alpha Pegasi is Markab, Beta Pegasi is Scheat, and Gamma Pegasi is Algenib. These with Alpha Andromedæ constitute the great square of Pegasus. In classical mythology, a winged steed which sprang forth from the neck of Medusa after her head had been severed by Perseus; so called because born near the sources (*pegai*) of Ocean. As soon as he was born he flew upward, and fixed his abode on Mount Helicon, where, with a blow of his hoofs, he produced the fountain Hippocrene. In ichthyology, the only genus of the family *Pegasidæ*. Pectoral fins broad, horizontal, long, composed of simple rays, sometimes spinous. Upper part of the snout produced. Four species are known; all very small fishes, probably living on sandy shoal places near the coast.

Pegmatite, anything fastened together; in petrology, the same as GRAPHIC GRANITE (*q. v.*). Some petrologists include under this name all granites of very large grain, which contain cavities in which crystals of accessory minerals occur very abundantly, such as tourmaline, topaz, beryl, etc.

Pegu, a town, division, and river of Lower Burma. The town stands on the river Pegu, 46 miles N. E. of Rangoon. The old city was founded in 573 and was made the capital of a powerful independent kingdom. European travelers in the 16th century speak of its great size and magnificence. It was destroyed in the middle of the 18th century by Alompra; but was rebuilt. A celebrated pagoda still stands within part of the old walls. The place was handed over to the British by the inhabitants both in the first and second Burmese war.

Peg Woffington. See WOFFINGTON, MARGARET.

Pehlevi, Pehlavi, or Pahlavi, a Parsee sacred language, which succeeded the Zend and preceded the modern Persian. It was a development of the old Zend. The Zend Avesta was translated into it.

Pei-ho, a river of China, rises near the borders of Mongolia, flows N. E. and S. E., past Peking and Tient-sin, and falls into the Gulf of Pechili after a course of more than 350 miles. The mouth of the river is defended by the powerful forts of Taku. See CHINA.

Peine forte et dure, in Old English law, a penalty or punishment inflicted on those

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who, being charged with felony, remained mute, and refused to plead. It was introduced by a statute of Edward I., and was vulgarly called pressing to death, whence there was in Newgate a place called the press yard, where such penalty was inflicted.

Peirce, Benjamin, an American mathematician; born in Salem, Mass., April 4, 1809; studied at Harvard, where in 1833 he became professor. In 1849 he became consulting astronomer to the "American Nautical Almanac"; and from 1867 to 1874 he was superintendent of the Coast Survey. In 1836-1846 he issued an admirable series of mathematical text-books, and he contributed to various mathematical journals. His paper on the discovery of Neptune (1848) attracted universal attention; and his papers on the constitution of Saturn's rings (1851-1855) were equally remarkable. His great "Treatise on Analytic Mechanics" appeared in 1857; and he left his mark on various departments of mathematical and astronomical investigation. He died in Cambridge, Mass., Oct. 6, 1880.

Peirce, James Mills, an American educator; born in Cambridge, Mass., May 1, 1869; was graduated at Harvard in 1893. In 1861-1869 he was assistant Professor of Mathematics in Harvard, and in 1869 became full professor. He wrote "Text-Book of Analytic Geometry"; "Elements of Logarithms"; etc. He died March 21, 1906.

Pekan, *Mustela pennanti*, Pennant's marten, a North American species, larger than those found in Great Britain, being about four feet long, including the tail. Its face is dog-like; fur brown, with white patches on chest and belly. Its favorite food is said to be the Canadian porcupine (*Erythizon dorsatus*), but it often steals the fish used to bait traps, whence it is sometimes called the fisher.

Peking, or Pekin, the capital of the Chinese empire, province of Chih-le, or Pechili, in a vast sandy plain, between the Pei-ho and its important affluent, the Hoang-ho, 562 miles N. W. of Nankin, and 100 miles W. N. W. of the Gulf of Pechili, in the Yellow Sea. It consists of two contiguous cities, each separately surrounded by walls, and together entered by 16 gates. The entire circumference is 25 miles. The northern city, which is nearly a perfect square (called Nei-tching, or the inner city, and sometimes the "Imperial" and "Tartar City"), consists of three enclosures. The outer one, formerly occupied by the Tartar garrison, is now used by Chinese traders. The second enclosure contains the residences of the dignitaries of the empire and foreign legations, the national literary institutions, and the temples of Ancestors and Peace, and is inhabited mostly by the

Manchus. The inner enclosure, or "for bidden city," surrounded by walls of yellow tiles, 2 miles in circumference, hence called the "Yellow Wall," contains the palaces of the emperor and empress. The southern city, called the Wai-ching, or "outer city," is also square, and occupied by the Chinese, and is both the seat of business and the residence of most of the population. The wall is 30 feet high, 25 feet thick at the base, and 12 feet at the top. That of the imperial city is 40 feet high. Square towers project from the outer side at intervals of 70 yards from each other; and each of the 16 gates is surmounted by a tower nine stories high, with portholes for cannon. The principal streets are very wide and regular, running between opposite gates. These are mostly filled with shops, extravagantly gilded and ornamented with blue and gold, flags, etc., and are almost always crowded, in consequence of the numbers of trades carried on in the open air. The houses are generally one story high, and built of brick. Of the ornamental buildings, the most conspicuous are those commonly called triumphal arches. They consist of a large central gateway, with small ones on each side, all covered with narrow roofs, and like the houses are splendidly gilded, varnished, and painted. Besides these, there are numerous pagodas, a beautiful mosque, Greek church, and convent. Peking is indebted for its importance to its being the residence of the emperor and the seat of government. It is not distinguished by any peculiar manufacture; nor has it any foreign commerce or trade other than that directed to the supply of its own wants. This, however, is necessarily very considerable. The country round the city being sandy and poor, a large portion of its supplies are brought from a distance—partly from sea by the Pei-ho, but principally by the Grand canal and the Eu-ho, which connect it with Nankin and most of the E. provinces. The early history of Peking is involved in obscurity. It was besieged and taken by the Mongols, led by Zinghis Khan, when the inhabitants, for want of ammunition, are said to have discharged ingots of gold and silver on their assailants. Kublai Khan rebuilt it, and made it his capital in 1260. The Mongol dynasty, founded by Kublai Khan, continued to occupy this city till it was expelled from China, in 1367. In 1421, the third emperor of the Chinese dynasty of Ming transferred his residence thither from Nankin, since which it has been the capital of the empire. It surrendered to the allied armies of France and England in 1860, on which occasion the Yueng-ming, or summer palace of the emperor, situated in the vicinity of the city, was destroyed. During the "Boxer" uprising of 1900 the various

foreigners in Peking were besieged in the English legation. For weeks they were given up as lost, but they managed to hold out till the arrival of the foreign troops. Pop. (about) 700,000. See BOXERS: CHINA.

Peladan, Josephin, "THE SAR," a French mystical writer; born in Lyons, in 1859. He gave himself out to be a descendant of the last of the Babylonian kings, and as such took the name or title of "Sar," and assumed a theatrical garb. He reinstituted the Templar Order of the Rosy Cross, of which he was grand master. For the "salon of the Rosy Cross" he prepared dramatic pieces, among them: "The Son of the Stars," a sort of Wagnerian-Chaldaic play in three acts (1892); and "Babylon," a tragedy in four acts (1893). His masterpiece is a romantic cyclus, "Latin Decadence," a mixture of astrology, mysticism, and esotericism. The first romance in the cyclus is "The Supreme Vice" (1886); others are "The Man-Woman" (1890); "The Woman-Man" (1891). He also wrote "Æsthetic Decadence" and "Ochlocratic Art" (1880).

Pelagians, a sect of heretics that arose in the Church about the beginning of the 5th century. Their founder was Pelagius, a monk, a native of Britain, whose original name was Morgan. He is said to have been characterized by great earnestness of character and moral strictness of life. He was greatly scandalized by the gross sensualities and immoralities that prevailed in the Church, and was of opinion that they arose from a belief in the efficacy of the sacraments and the sufficiency of faith. The remedy for all, he thought, would be a creed holding man's salvation to be dependent on his own exertions. Pelagius went to Rome, and afterward to Carthage, where he was condemned by a council as holding the following heresies: (1) That Adam was by nature mortal, and would have died whether he had sinned or not; (2) that the consequences of Adam's sin were confined to himself, and did not affect the human race; (3) that new born infants are in the same condition as Adam was before his fall; (4) that the law qualified men for heaven, as well as the Gospel; and that before Christ some men had lived without sin; (5) that a man may keep the commandments of God without difficulty, and preserve himself in a state of perfect innocence; and that the grace of God is given in proportion to our merits. These are the chief errors which are generally reckoned under the name of Pelagianism, though it is doubtful how far they were held by Pelagius himself, as he always expressed himself very cautiously. Pelagius was arraigned before two ecclesiastical councils at Jerusalem and Diospolis, in 415; but

Pelagic Sealing

with sophistry and equivocation, he succeeded in baffling his accusers. One of his most powerful opponents was Augustine, and Pope Innocent I., in 417, was induced to anathematize the rising heresy. His successor, Zosimus, also condemned the obnoxious doctrine, and the emperor promulgated decrees of confiscation and banishment against them. Pelagius retired into exile, where he died. His followers never formed a sect properly so called; but Pelagianism, as a theological system, has never been without its advocates. The ninth article of the English Church is directed against the Pelagian error respecting original sin.

Pelagic Sealing, the taking of seal in the open sea. By the Paris award of 1893, pelagic sealing within a zone of 60 miles of the Pribyloff islands was forbidden. See **BERING SEA**.

Pelagius, the author of the system of doctrine which goes by his name, was understood by his contemporaries to be of British birth, and the name is supposed to be a Græcized form of the Cymric Morgan (sea-begotten). He was not a monk, but he adhered to monastic discipline, and distinguished himself by his sanctity and purity of life. He came to Rome in the beginning of the 5th century, and is there said to have learned the opinions afterward identified with his name from a monk Ruffinus, whose teaching was founded on that of Origen. In A. D. 410, during Alaric's third siege of the city, he escaped with his convert and pupil, Cœlestius, to Northern Africa, and had gone from there to Palestine before the meeting of the Council of Carthage (411-412) which condemned Cœlestius. In Palestine he lived unmolested and revered till 415, when Orosius, a Spanish priest, came from Augustine to warn Jerome against him. The result was that he was prosecuted for heresy, but two councils (at Jerusalem, and at Diospolis, the ancient Lydda) pronounced him orthodox. He was subsequently expelled from Jerusalem, however, in consequence of condemnations by the Council of Carthage in A. D. 417 and 418, and by a synod held at Antioch in A. D. 421. Nothing is known of his subsequent career.

Pelagius, Pope; a native of Rome; ascended the papal chair in succession to Virgilius, in 555. He endeavored to reform the clergy; and when Rome was besieged by the Goths, he obtained from Totila, their general, many concessions in favor of the citizens. He died in 560.

Pelagius, II., Pope; ascended the papal chair, in succession to Benedict I., in 578. He opposed John, Patriarch of Constantinople, who had assumed the title of œcumenic or universal bishop. He died of the plague in 590.

Peleus

Pelamis, a genus of *Hydrophidæ*, or sea snakes, with a single species, ranging from Madagascar to New Guinea, New Zealand, and Panama.

Pelamys, in ichthyology, a genus of *Scombridæ*. First dorsal continuous, from seven to nine finlets behind dorsal and anal; the scales of the pectoral region form a corslet. Five species are known, of which *P. sarda* is common in the Atlantic and the Mediterranean.

Pelargonium, a large genus of *Geraniaceæ*, divided into about 15 sub-genera. The calyx is spurred, the corolla generally with five, four, or two petals, irregular, and the stamens 10, only seven to four perfect. Most of the species are from the Cape of Good Hope, one is from the Canary Islands, one from Asia Minor, and a few from Australia. Extensively cultivated in England for their beauty in flower pots in houses, in greenhouses, and in the open air. The genus readily forms hybrids, which most of the cultivated species are. They are popularly called geranium. *P. antidysenterium* is used among the Namaquas in diarrhœa. The tubers of *P. triste* are eaten.

Pelasgian, one of an ancient and widely diffused prehistoric tribe which was the common parent of the Greeks and of the earliest civilized inhabitants of Italy. Most authors agree in representing Arcadia as one of their principal seats, where they long remained undisturbed; but the origin of this people is lost in myth. Traces of them are found in Asia Minor and Italy. The term Pelasgi was used by the classic poets for the Greeks in general.

Peleg Arkwright. See **PROUDFIT, DAVID LAW**.

Peleus, in mythology, a King of Thesaly. He married Thetis, one of the Nereids, and was the only one among mortals who married an immortal. Being accessory to the death of his brother Phocus, he retired to the court of Eurytus, who reigned at Phthia. He was purified of his murder by Eurytus, who gave him his daughter Antigone in marriage. Peleus subsequently killed Eurytus by accident, while in the chase of the Calydonian boar. This event obliged him to retire to Iolchos, when the wife of Acastus, king of the country, brought certain charges against him, which caused him to be tied to a tree on Mount Pelion, that he might become the prey of the wild beasts of the place; but Jupiter, aware of the innocence of Peleus, ordered Vulcan to set him at liberty. Peleus afterward revenged himself on Acastus, by driving him from his possessions and putting to death his wife. After the death of Antigone, Peleus fell in love with Thetis, who rejected his suit because he was a mortal. Having offered a sacrifice to the gods, Proteus at length informed him that to ob-

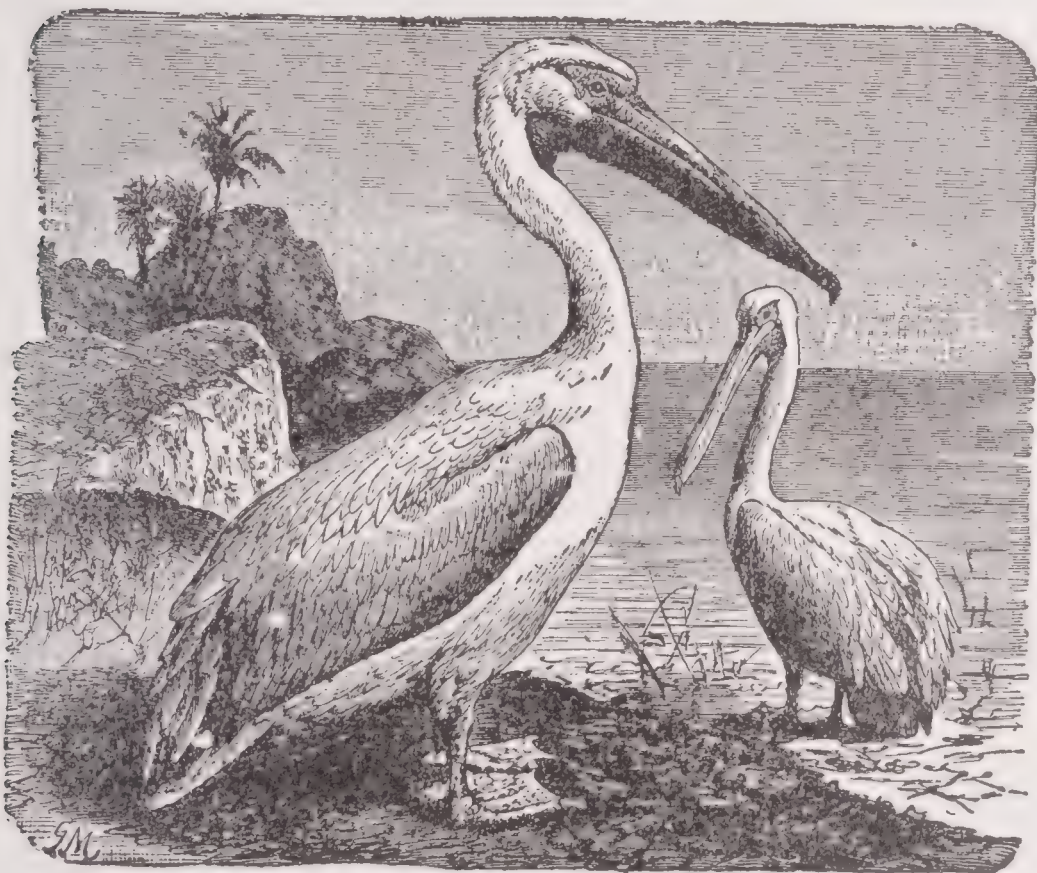
tain Thetis he must surprise her asleep in her grotto, near the shores of Thessaly. This advice was followed; and Thetis, unable to escape from the grasp of Peleus, at last consented to marry him. Their nuptials were celebrated with the greatest solemnity by all the gods, who made them each the most valuable presents. The goddess of discord was the only one of the deities who was not present. From the marriage of Peleus and Thetis was born Achilles. The death of Achilles was the source of so much grief to Peleus, that Thetis, to comfort her husband, promised him immortality, and commanded him to retire to the grottos of the island of Leuce, where he would see and converse with the manes of his son.

and visited again in 1696. In 1899 Spain sold this group, with the Carolines and all of the Ladrones excepting Guam, to Germany.

Pelias, the adder, or common viper; a genus of *Viperidæ*, with a single species (*P. berus*), common in Europe. No teeth in upper maxillaries, except the poison fangs; a row of small teeth on the palatine bone, on each side of the palate. It is probably the *vipera* of Vergil.

Pelias, in Greek mythology, son of Neptune, and King of Iolcus. The legends ascribe to him the Argonautic expedition, for he wished to be rid of Jason. Medea bade his daughters cut him in pieces and boil him, to make him young again, but he died while undergoing the process.

Pelican, any bird of the genus *Pelecanus*, and especially the common pelican, the *onocrotalos* of the Greeks and Romans, and the *Pelecanus onocrotalus* of modern science. Pelicans are large piscivorous water fowl, with an enormous pouch dependent from the flexible branches of the lower mandible, but capable of being contracted when not in use as a depository for food. The species are widely distributed, and frequent the shores of the sea, rivers, and lakes, feeding chiefly on fish, which they hunt in shallow water, the pelican of the United States (*P. fuscus*) being the only species which dives for its prey. The common pelican is about the size of a swan, though its enormous bill



PELICAN ONOCROTALUS.

Pelew Islands, or Palau, a group in the Pacific formerly belonging to Spain, lying S. E. of the Philippines, at the W. extremity of the Caroline Archipelago, with which they are sometimes classed. There are about 200 islands, mountainous, wooded, and surrounded with coral reefs. Total area, 170 square miles. The principal is Babelthouap or Babeltop. The soil is rich and fertile, and the climate healthy. Bread fruit, cocoanuts, sugar cane, palms, areca nuts, yams, etc., are grown. Turtles, trepang, and fish abound on the coasts. The inhabitants, about 10,000 in number, are of the Malay race. The men go entirely naked and the women nearly so. They are described as being good-natured, and have peculiar social institutions. The islands were discovered by the Spaniards in 1543,

and loose plumage make it look considerably larger; it is white, slightly tinged with flesh color, and the breast feathers become yellow in old birds. It usually nests on the ground, in some retired spot near the water, and lays two or three white eggs. The pelican sits during the night with its bill resting on its breast; and, as the hook at the extremity of the bill is red, this may have given rise to the legend that the bird feeds its young with blood from its own breast, though it is possible that the story has some foundation in fact. It is well known that the males of many species assiduously feed the hen birds during incubation; and in 1869 the flamingoes in London Zoölogical Gardens were observed to inject into the mouth of the cariamas, apparently in the belief that the latter were

in want of food, a glutinous red fluid, which, on microscopical examination, was found to consist almost entirely of blood corpuscles.

In chemistry, an alembic with a tubulated capital, from which two opposite and crooked beaks passed out, entering again at the belly of the cucurbit. In dental surgery, an instrument for extracting teeth, curved at the end like the beak of a pelican. In art, the pelican is the symbol of charity. It is generally represented wounding its breast to feed its young with its own blood — a tale told in the fabulous natural history of the Middle Ages, and which made the bird the adopted symbol of the Redeemer. When so represented the pelican is said to be "in her piety." In crucifixes the lamb is at the foot and the pelican at the top of the cross.

Pelican, The, the ship in which Sir Francis Drake made his voyage around the world. He left Plymouth with four ships besides the "Pelican," Nov. 15, 1577, and completed his journey Sept. 15, 1580. The "Pelican" was the only ship he brought back with him, and it was for a long time carefully preserved by order of Queen Elizabeth. When finally broken up, a chair was made from its timbers by John Davis, the Arctic navigator, which is now in the Bodleian Library.

Pelides, son of Peleus — that is, Achilles.

Pelion, in ancient geography, the name of a wooded mountain range in Thessaly, extending along the E. coast. Its E. side descends in steep and rugged precipices to the sea. Further to the N., near the mouth of the Peneus, is the steep conical peak of Ossa, which, according to the classic myth, the Titans placed on the summit of Pelion in order to scale Olympus, the abode of the gods. The modern name is Zagorá, and as of old, its sides and summit are clothed with venerable forests of oak, chestnut, beech, elm, and pine.

Pelissier, Aimable Jean Jacques, Duke of Malakoff, a marshal of France; born near Rouen in 1794. He entered the army at the age of 19, and distinguished himself in Africa and was created Lieutenant-General in 1848 and was called in 1855 to take a command in the Crimea under General Canrobert, whom he soon superseded as Commander-in-Chief. He distinguished himself in the successful attack on Kertch, in the battle of the Tchernaya, and above all in the storming of the Malakoff Tower at Sebastopol, Sept. 8, 1855. He was soon after created Marshal and Duke of Malakoff. In 1858 he was ambassador to London; was subsequently appointed governor general of Algeria, and died there in 1864.

Pelitic Structure, a term in geology, applied to rocks which have a texture like that of dried mud.

Pella, the ancient capital of Macedonia, and the birthplace of Philip II. and Alexander the Great; situated in the midst of marshes, a few miles N. W. of Thessalonica, which stood half way between it and the head of what is now the Gulf of Saloniki. Its royal castle had wall paintings by Zeuxis.

Pellagra, a disease common among the peasantry of Northern Italy, the Asturias, Gascony, Rumania, and Corfu, caused by living on maize affected by a parasitic fungus. It is not *morbis miserie* pure and simple, as it is entirely absent from certain zones where such diseases undoubtedly exist. It commences by the appearance of a shining red spot on some part of the body, the skin becomes dry and cracks, and the epidermis falls off in white bran-like scales, leaving a shining redness as before.

Pellegrin. See LA MOTTE-FOUQUE.

Pellegrin, Simon-Joseph, a French dramatist; born in Marseilles, France, in 1663. Among his works are: "Polydorus," a tragedy (1705); "Death of Ulysses" (1706); "The New World," comedy (1723); "Divorce of Love and Reason" (1724); "Pastor Fido" (1726); "Hymen's School; or, Her Husband's Sweetheart" (1742). He wrote also a great many religious poems. He died in Paris, in 1745.

Pellegrini, Carlo, an English caricaturist; born in Capua, Italy, in 1839, went to London in 1865, and from 1868 till his death, Jan. 22, 1889, was the "Ape" of "Vanity Fair," the delineator of its inimitable series of cartoons of celebrities.

Pelletan, Pierre Clément Eugène, a French publicist; born Oct. 29, 1813. Under the signature "An Unknown," he won distinction as a literary and philosophical critic and writer on social questions in the Paris "Presse." Noteworthy among his writings are: "The Extinguished Lamp," a philosophical novel (1840); "Dogma: the Clergy and the State" (1848); "Rights of Man" (1858); "Some People and Others" (1873), a curious collection of personal reminiscences. He died Dec. 13, 1884.

Pellico, Silvio, an Italian patriot; born in Saluzza, in Piedmont, in 1789. In early life he gained considerable distinction as a writer for the stage; and his tragedy, "Francesca da Rimini," may still be read with interest. In 1819 he became connected with the press, at the same time that he was tutor in the family of Count Porro; and in 1820 he was seized as a carbonaro by the Austrians at Milan, and confined in the fortress of Spielberg for 10 years. The volume on which his fame rests tells the story of his imprisonment. His treatment

was not distinguished by the most terrible hardships or tortures which other more illustrious persons have undergone, but it tells a tale of solitude, of patient endurance,



SILVIO PELLICO.

and of pleasing sentiments continually keeping alive the strength of hope and affection, which has endeared the volume and the writer to numbers who could scarcely grasp the political idea involved. Released by the amnesty of 1830, he found shelter at Turin, and was employed as librarian in the house of the Marchesa Barolo till he died. His imprisonment had ruined his health, and he took no further part in politics. He died in 1854.

Pellitory, *Anacyclus pyrethrum*, a composite plant growing in Barbary, Spain, etc. The root, a fusiform one, is transported from the Levant. Tincture of pellitory made from it is a topical irritant, used in medicine as a masticatory in paralysis of parts of the mouth, neuralgia in the teeth, and in a relaxed state of the throat. Pellitory of the wall; the genus *Parietaria*, and specifically *P. officinalis*. It has oblong ovate, or ovate lanceolate leaves, an involucre, and three to seven flowered bracts.

Pelloutier, Simon, a German historian; born in Leipsic, Germany, in 1694. He wrote a "History of the Celts" (2 vols. 1740-1750), a work of immense research and written in most attractive style. He died in Berlin, in 1757.

Pelopidas, a Theban general, the friend of Epaminondas and the associate of his victories. When the Spartans conquered Thebes, Pelopidas went to Athens, where he assembled his exiled countrymen, with whom he returned, seized on Thebes, and expelled the invaders. Afterward he defeated the Lacedæmonians at Tegyra, and shared with Epaminondas the victory of Leuctra. Pelopidas being sent ambassador to Alexander, the tyrant of Pheræ, was thrown into prison; but on the appearance of Epaminondas he obtained his release. He next went to the court of Persia, and after his return commanded the forces sent to the relief of Thessaly, where he fell in 364, B. C.

Peloponnesus, the ancient name of the Morea. Among its most important cities were Sparta in Laconia, and Argos the capi-

tal of Argolis. Sparta acquired, after the Messenian war, a decided supremacy over the other states, and disputed the supremacy with Athens in a war of almost 30 years' duration (431-404 B. C.)—the famous Peloponnesian War, of which the history has been written by Thucydides. After the Roman conquest, the Peloponnesus formed part of the province of Achaia, and subsequently belonged to the Byzantine empire. See MOREA.

Pelops, in Greek mythology, the grandson of Zeus, and the son of Tantalus, was slain by his father, and served up at an entertainment which he gave to the gods, in order to test their omniscience. They were not deceived, and would not touch the horrible food; but Demeter, absorbed with grief for the loss of her daughter, ate part of a shoulder without observing. The gods then commanded the members to be thrown into a cauldron, out of which Clotho brought the boy again alive, and the want of the shoulder was supplied by an ivory one. According to the legend most general in later times, Pelops was a Phrygian, who, being driven by Ilos from Sipylos, came with great treasures to the peninsula which derived from him the name of Peloponnesus, married Hippodamia, obtained her father's kingdom by conquering him in a chariot race, and became the father of Atreus, Thyestes, and other sons. But in what appear to be the oldest traditions he is represented as a Greek, and not as a foreigner. He was said to have revived the Olympic games, and was particularly honored at Olympia.

Peloria, the abnormal regularity of flowers usually irregular but symmetrical. It often occurs in *Graminaceæ*, *Leguminosæ*, *Labiataæ*, *Scrophulariaceæ*, and *Violacææ*. For instance, in the toad flax (*Linaria vulgaris*) there are sometimes five spurs instead of one.

Peltier, Jean Charles Athanase, a French physicist; born in 1785; was the author of numerous papers in different departments of physics, but his name is specially associated with the thermal effects at junctions in a voltaic circuit. He died in 1845.

Peltry, a general term applied to the trade in skins of wild animals, and to the skins themselves. It is understood to mean only skins undressed, except by drying, and chiefly those which, when dressed, are called furs. See FURS.

Pelusium, the Greek name of an ancient Egyptian city, situated at the N. E. angle of the Delta, and important as the key of Egypt on the Asiatic side. The E. mouth of the Nile derived from it the epithet Pelusiatic. Its identity with Sin of the Old

Testament and the Greek Saïs is doubtful. The Ostium Pelusiacum was choked up with sand as long ago as the 1st century B. C., and the whole district is a wilderness of sand and marshes.

Pelvis, the lower portion of the great abdominal cavity, bounded by the abdomen above, the perineum below, the peritoneum, muscles, and fascia in front, below, and at the side; and the sacral plexus of nerves and the sacrum behind. It contains the bladder, prostate gland, *vesiculæ seminales*, and rectum. It is composed of the two *ossa innominata*, the sacrum and the coccyx. There are marked differences in the male and female pelvis; that of the male is the stronger, with a deeper and much narrower cavity; that of the female is much shallower and more widely expanded. The axis of the inlet is downward and backward, and of the outlet downward and forward. These points are of great importance to the surgeon and the accoucheur.

Pemba, a coral island off the E. coast of Africa; 50 miles N. E. of Zanzibar Island, length 46 miles, breadth $4\frac{1}{2}$; area, 372 square miles. There are numerous bays on the E. coast; on one of them stands the chief town, Chaka. The inhabitants, 10,000 in number, rear cattle and trade in rice, cloves, and ebony, all products of the island. It was transferred by the Sultan of Zanzibar to the British East Africa Company in 1891.

Pemberton, Max, an English novelist; born in Birmingham, England, June 19, 1863. He was a contributor to "Vanity Fair," and editor of "Chums," a boys' paper, and in charge of "Cassell's Magazine." He published "The Iron Pirate" (1894), "Sea-Wolves" (1894), and "The Impregnable City" (1895), stories of adventure; "The Little Huguenot"; "A Puritan's Wife" (1896); "A Gentleman's Gentleman" (1896); "Christine of the Hills" (1897), a novel of Dalmatian life, considered his best work. "The Garden of Swords" (1899), etc.

Pembroke, the county town of Pembrokeshire, Wales; on a navigable creek of Milford Haven, 114 miles W. by N. of Cardiff. On the extremity of the ridge on which the town is built stands Pembroke Castle, founded in 1094 by Arnulf de Montgomery, a very imposing ruin, with a Norman keep 75 feet high and 52 in diameter. Beneath is a huge natural cavern, 70 by 50 feet. The birthplace of Henry VII., this castle in 1648 was taken by Cromwell after a six weeks' siege. Monktown Priory, with its roofless Decorated choir, is another interesting structure. Pembroke for more than four centuries has given the title of earl to the House of Herbert. Pop.

15,853. At Pembroke Dock, or Pater, $2\frac{1}{2}$ miles N. W., is the naval dockyard and arsenal, established in 1814. It embraces an area of 70 acres, and since 1861 has been fortified at a cost of more than \$2,500,000.

Pemmican, or **Pemican**, meat cut in thin slices, divested of fat, and dried in the sun, then pounded into a paste, mixed with melted fat, and sometimes dried fruit, and pressed tightly into cakes or bags. It is an easily preserved food, and will keep for a long time, and contains much nutriment in a small compass.

Pemphigus, or **Pompholyx**, a skin disease which is characterized by an eruption of large vesicles, filled with serous fluid, and known as bullæ. The disease occurs both in acute and in the chronic form. In a mild case of acute pemphigus, bullæ, or blisters, from the size of a pea to that of a chustnut, appear in succession (chiefly on the extremities), and having continued three or four days break, form a thin scab, and soon heal, unaccompanied with febrile or inflammatory symptoms. In severe cases there is considerable constitutional disturbance, the bullæ are larger, and the scabs heal with difficulty. The chronic form differs mainly from the acute by its prolonged continuance. The acute variety chiefly affects children, and has been ascribed to dentition, errors of diet, etc.; while the chronic form chiefly attacks aged persons, and is probably due to debility and impaired nutrition. The acute form usually requires nothing but cooling medicines and diet, and mild local dressings, such as simple cerate, to protect the raw surfaces from exposure to the air. In the chronic form a nutritious diet, with the judicious use of tonics (iron, bark, etc.), is most commonly successful. In obstinate cases arsenic is sometimes of use.

Pen, an instrument for writing with a fluid. Pens of some sort have been in use from very early times, adapted to the material on which the characters were to be inscribed. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in Eastern countries. It has been asserted that quills were used for writing as early as the 5th century A. D. In Europe they were long the only writing implements, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the 19th century these formed the principal material from which pens were made. In 1803 Wise produced steel pens of a barrel form, mounted in a

bone case for carrying in the pocket. They were of indifferent make, and being expensive (costing 60 cents each originally, though the price was subsequently reduced to 12), were very little used. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. Mr. Gillott was followed into the same field by Mr. Perry and others, and their improvements so reduced the cost and raised the quality, that a gross of better pens are now sold by the same makers at less than one-sixth of the price of a single pen in 1821. Cast-steel of the finest quality is used in the manufacture, and the various operations are performed by cutting, stamping, and embossing apparatus worked mostly by hand-fly presses. Birmingham was the first home and is still the principal center of the steel-pen industry. Gold pens tipped with minute particles of iridium are now in extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah.

Penal Laws, laws which prohibit an act, and impose a penalty for the commission of it.

Penal Servitude, a form of punishment in English criminal law, substituted, in 1853, for the punishment of transportation. It consists in imprisonment with hard labor for a term of years, from two up to the duration of life, in one of the penal establishments in Great Britain, or in any of the British dominions beyond the seas.

Penance, in Roman theology and ritual: 1. The virtue which inclines the soul to detest sin for its own sake — that is, because it is an offense against God. 2. The outward acts by which sorrow for sin is evinced. 3. The satisfaction which a priest imposes on the penitent before giving absolution, often called sacramental penance. 4. A sacrament of the New Law, whereby sins, whether mortal or venial, committed after baptism, are forgiven. The Council of Trent defines that the form of the sacrament consists in the words, "Ego te absolvo," etc., the "quasi materia" in the acts of the penitent — contrition, confession and satisfaction. The minister of the sacrament is a priest with ordinary or delegated power to absolve, and the subjects those who have received baptism. It is not of obligation to confess venial sins, but mortal sins committed after baptism must be confessed. Roman theologians rely on the words of Jesus (John xx: 23) as proving the divine institution of the sacrament of penance. The dispositions and acts necessary on the part of the penitent are a

hearty sorrow for sin, because it is an offense against God, joined with a firm purpose of amendment, the confession of sins to a priest approved by the bishop, and the performance of the penance imposed by him.

Penance, Tribunal of, the confessional.

Penang, Pulo=Penang, or Prince of Wales Island, an island belonging to Great Britain, lying at the N. entrance of the Straits of Malacca, off the W. coast of the Malay Peninsula, from which it is separated by a channel 2 to 5 miles across; area, 107 square miles. Two-fifths of Penang is plain, and the rest hills — for the most part wooded — which rise to a height of 2,734 feet in the peak now used as a sanatorium. The climate is hot, but very healthy. The scenery is charming. The island produces cocoanuts and arecanuts, nutmegs and cloves, rice, sugar, coffee, and pepper. George Town, or Penang, the capital and port of the settlement, is a handsome town, rapidly increasing in size, and has a large commerce. The harbor is the strait between island and mainland. Penang was made over by treaty to the East India Company in 1786 by the Rajah of Quedah, and with Province Wellesley, a long strip of the Malay Peninsula opposite (area, 270 square miles), it now forms one of the Straits Settlements, having a resident councillor to control administration. Pop. 235,618.

Penates, the Roman gods of the store-room and kitchen. The family hearth, which formerly stood in the atrium, was their altar, and on it their images, two in number, were placed, with the image of the Lar between them. These penates were represented dancing and elevating a drinking horn in token of joy and plenty. The calends, nones, and ides of each month were set apart for their worship, as were the caristia (Feb. 22) and the saturnalia. Each family had its own penates, and the state had its public penates. The worship of these gods was closely connected with that of Vesta, in whose temple the public penates were at one time worshiped, though they had a temple of their own near the Forum. It is possible that the former may have been the penates of Latium, while the latter may have been the penates of the city. The origin of these gods is extremely doubtful. According to ancient tradition they were first worshiped in Samothrace, thence brought to Troy, and Vergil makes Æneas the means of their introduction into Italy. As was the case with the Lares, their name was a synonym for home.

Pencil, a name applied to instruments for writing, drawing, or painting, differing as much in their construction as in the use to which they are applied. There are now in use the following kinds of pencils: Hair pencils, black lead pencils, chalk pen-

Pencil

cils, and slate pencils. The first are used for painting or writing with fluid colors, either oil or water, and in China and Japan are employed almost entirely instead of pens for writing; the color used being the black or brown pigment obtained from various species of sepia or cuttle fish. The well-known black lead pencil is made by cutting black lead or plumbago into thin plates with a saw, and again into strips as wide as the plate is thick. These strips are then laid in a groove in a piece of cedar, on which is glued another and thinner piece; the whole is afterward rounded by a plane adapted to that purpose. Some pencils are filled with colored chalk instead of black lead.

The ever-pointed pencil is an instrument for using cylindrical pieces of black lead, which are forced forward in the pencil just so far as to allow them to be used without breaking. The leads are manufactured of different thicknesses, and the pencil cases are marked with a letter to correspond with the lead required for it. The pencils for using liquid colors or paints are of course wholly different from those just described. They are made of hog's bristles, camel's hair, fitch, sable, etc. Those of a large and common kind are described under BRUSH (*q. v.*). The soft pencils for artists are made as follows: The tail of the animal (sable, badger, marten, etc.) is scoured in a solution of alum; then steeped for several hours in lukewarm water; then dried in linen cloths; and finally combed out regularly. The hairs are seized with pincers, and cut off near the skin; and the little parcels of hair are sorted into groups according to their length. A few hairs are then taken — enough for one pencil — and placed in a little receptacle, which holds them while a thread is bound round near the roots. The base of the pencil is then trimmed flat by scissors. The hairs thus prepared are fitted either into quills or into tin tubes. The quills are those of swans, geese, ducks, lapwings, pigeons, or larks, according to the size of the pencil. Each quill is softened and swelled in hot water; and the bunch of hairs is introduced at the larger end, and pulled forward by a simple apparatus to the smaller end, where the shrinking of the quill binds the hairs closely. The great art in pencil making is so to arrange the hairs that their ends may be made to converge to a fine point when moistened and drawn between the lips. Women are generally more successful than men in preparing the small and delicate pencils. Slate pencils, for writing on slate, are made either by cutting slate into thin sticks, and rounding them, or by cutting it into fine square slips, and encasing them in wood, as in the case of black lead, etc.

Pendleton

In optics, an aggregate or collection of rays of light which converge to, or diverge from, the same point.

Pendant, in architecture (1) an ornament which is suspended from the roof of a Gothic or Tudor building; the hanging pendants of a vaulted ceiling, uniting solidity with ornament. There are some excellent samples in Henry VIIIth's Chapel in Westminster Abbey, London. In vaulted roofs pendants are formed of stone, richly sculptured, and in timber work they are of wood carved. (2) A hanging keystone, the lower face of which projects beyond the intrados of the arch.

In art (in the plural), two pictures, statues, or groups of sculpture or engravings, which, from their similarity of subject, size, form, etc., can be placed together with due regard to symmetry. Nautically: (1) A strap or short rope depending from a mast-head, and having thimbles for bearing the blocks, which transmit the effects of tackles to distant points, etc. Used especially in setting up masts and rigging. (2) A pennant.

Pendentive, the portion of a groined ceiling supported and bounded by the apex of the longitudinal and transverse vaults. In Gothic ceilings of this kind the ribs of the vaults descend from the apex to the imposts of each pendentive, where they become united. The filling-in of the spandrels between the arches of a vault, or of those under the dome.

Pendleton, George Hunt, an American statesman; born in Cincinnati, O., July 25, 1825; received an academic education, after which he studied law and was admitted to the Ohio bar. He was elected a State senator in 1854-1855, and afterward acted as congressman from 1856 to 1865, having been elected on the Democratic ticket. During each term he served as a member of the Committee on Military Affairs, and in the 38th Congress was a member of the Ways and Means Committee, as well as chairman of a special committee on admitting cabinet officers to the floor of the House. He was the candidate for the vice-presidency on the Democratic ticket in 1864, with George B. McClellan. Before his appointment as United States minister to Germany by President Cleveland, in 1885, he represented Ohio in the United States Senate, and was the principal exponent of civil service reform. He died in 1889.

Pendleton, Louis (Beauregard), an American novelist and writer of juvenile literature; born in Georgia in 1861. His works deal principally with Southern scenes and characters, the most popular being: "In the Wire Grass" (1889); "King Tom and the Runaways" (1890), a juvenile tale; "The Sons of Ham" (1895); "In the Okefenokee," a juvenile tale.

Pendulum, in mechanics, a simple pendulum is a heavy particle suspended by a fine thread from a fixed point, about which it oscillates without friction. The time of its vibration is directly as the square root of the length, and inversely as the square root of the accelerating force of gravity. The length of the arc through which it vibrates does not affect the result. No simple pendulum can exist; all constructed by man are compound pendulums in which there gravitates, not a particle, but a heavy body called the bob, the law of friction of course operating.

In horology, the ordinary pendulum is believed to have been the invention of Ebn Junis of the University of Cordova, about A. D. 1100, his companion, Gerbert (poisoned in 1102), making the first escapement. Henry de Wyck (1364), Harris (1641), and Huyghens (about 1657), applied it to clocks; Gallieo, in 1581, having recommended a pendulous weight as a true measurer, and Sanitorius, in 1612, the combination of a pendulum with wheel work. Pendulums generally move in arcs of circles. In the cycloidal pendulum the rod of suspension describes the arc of a cycloid, and in the conical a cone. Heat lengthens, and cold contracts the rod of a pendulum, if it be of a single metal, as steel or iron. To neutralize these effects compensation pendulums are made; the gridiron pendulum having bars of iron and brass to work against each other, and the mercurial pendulum making the center of the oscillation of the bob uniform by the expansion and contraction of mercury inside. The curved line along which the bob of a pendulum moves is called the arc of vibration, the horizontal chord of that arc the axis of oscillation, and the point around which the pendulum moves the point of suspension, or the center of motion. The length of a pendulum vibrating seconds is directly proportionate to the force of gravity at the place. One constructed to beat seconds at London (lat. of Greenwich Observatory, $51^{\circ} 28' N.$) at the sea-level must measure 39.13983 inches; at the equator, 39.02074 inches; and at Spitzbergen, 39.21469 inches. To regulate a clock by means of a pendulum, the rod of the latter is made to pass between the prongs of a fork, and thus communicate its motion to a rod oscillating on a horizontal axis. To this axis is fixed a piece called an escapement, or crutch, terminated by two projections named pallets, which work alternately with the teeth of the escapement wheel. As the pendulum moves, the one crutch is raised allowing the wheel to escape from the control of the pallet, the weight then descends, till arrested and made to reascend by the action of the other pallet. The motion of the escapement is communicated by additional mechanism to the hands of the clock,

which are thus regulated by the pendulum, **Pendulum Observations**, an important kind of astronomical or geodetic work by which the force or acceleration of gravity at any point of the earth's surface is determined. The greater this force the faster will the same pendulum swing, and the observations consist in the determination of the duration of some large number of oscillations of the pendulum. Astronomical observations for determining the rate of the time piece used in the comparison are necessary, and a great many precautions as to the steadiness of temperature, firmness of support of the pendulum, protection of the same from injury in the transportation, and many other things have to be looked after, and the observations require skill and experience to attain good results. The more the subject is studied the more it is found that the earth is a very different thing from a perfectly symmetrical spheroid of revolution, and the determination of the acceleration of gravity at all possible points is one of the methods of tracing out the little irregularities in the body of the earth. These observations have the great advantage that they can be made at any place entirely independent of any other geodetic work, and of late the United States Coast and Geodetic Survey has been sending an observer for this purpose accompanying nearly every eclipse or transit of Venus expedition to any part of the globe.

Penelope, a celebrated Grecian princess, daughter of Icarus, wife of Ulysses (Odysseus), and mother of Telemachus. Accord-



PENELOPE AND ODYSSEUS.

ing to the Homeric legend, Ulysses, during his long wanderings after the fall of Troy, was generally regarded as dead, and Penelope was vexed by the urgent suits of many

Penguin

lovers, whom she put off on the pretext that she must first weave a shroud for Laertes, her aged father-in-law. To protract the time, she undid by night the portion of the web which she had woven by day. When the suitors had discovered this device, her position became more difficult than before; but fortunately Ulysses returned in time to rescue his chaste spouse from their distasteful importunities.

Penguin, a name first given to the great auk (*Alca impennis*), but now applied to any member of the family *Sphæniscidæ*. Penguins are aquatic birds confined to the high S. latitudes of both hemispheres, where they congregate in large flocks. The body is generally elliptical; neck of moderate length; head small; bill moderately long, straight, compressed; tail short. They have no quills in their wings, which



PENGUIN.

are as rigid as the flippers of a cetacean, and utterly useless for flight, though they move freely at the shoulder-joint, forming most efficient paddles, and are usually worked alternately with a rotatory motion. In standing, the penguin preserves an upright position, generally resting on the tarsus, which is widened like the foot of a quadruped; but in progression this is kept nearly vertical, and the weight supported on the toes alone. They make no nests, and lay a single egg, which is tended by both birds, and the female takes charge of the young for nearly 12 months. The emperor penguin is *Aptenodytes patagonica*, and the king penguin *A. longirostris*. Their molting is very peculiar. The flipper-like

Penitential Discipline

wings cast off short scale-like feathers; they flake off like the shedding of the skin of a serpent.

In botany, the broad-leaved pineapple, *Bromelia pinguin*, of which penguin is a corruption. It is very common in Jamaica, where it is planted as a fence around pasture lands, on account of its prickly leaves. When stripped of their pulp, soaked in water, and beaten with a wooden mallet, they yield a fiber whence thread is made. The juice of the fruit in water makes a good cooling drink in fevers. It is anthelmintic and diuretic, and can also be made into good vinegar.

Penicillium, in botany, a genus of hyphomycetous fungi. It consists of a dense, pasty crust, slimy below and above, consisting of minute pedicels, terminating in a pencil of moniliform spores. One, *P. glaucum*, is green mold.

Peninsula, a piece of land almost surrounded with water, and connected to the mainland by a narrow strip of land or isthmus. With the definite article the term is specifically applied to Spain and Portugal.

Peninsular Campaign, the name of the campaign conducted by Gen. George B. McClellan in 1862, on the peninsula between the York river and its tributaries and the James river.

Peninsular War, the war carried on in the beginning of the 19th century in Spain and Portugal by the British forces, aided by the native troops, against the French. Sir Arthur Wellesley, afterward the Duke of Wellington, landed, with 10,000 British troops, at Figueras, in Portugal, Aug. 1-3, 1808, and on the 21st defeated the French at Vimiera. On August 30 the Convention of Cintra was signed, by which Junot agreed to evacuate the country. Wellesley returning home, the command of the army, now increased to 20,000 men, was given over to Sir John Moore, who was forced by Soult to fall back on Corunna, where a battle was fought on Jan. 16, 1809, in which the former lost his life. Wellesley again received command of the army, and, after a series of sanguinary but generally successful combats, drove the French across the Pyrenees, entering France on Oct. 7, 1813.

Peninsula State, Florida; so named on account of its shape.

Penitential Discipline, the discipline used by the Church through her ministers, in punishing sinners. In primitive times it was extremely severe, admission to communion being often withheld till the penitent was at the point of death. In addition there was a period in which bodily austerities formed a principal part of the discipline. At the present time, in the Roman Church, public penance is hardly ever imposed, though in the 18th century of common occurrence.

Penitential Psalms, the seven psalms vi., xxxii., xxxviii., li., cii., cxxx., cxliii., of the Authorized Version, so termed as being specially expressive of contrition. Reference is made to them by Origen. They have a special place in the breviary of the Roman Church. The psalm most frequently repeated as being the most penitential is the Miserere, the li. of the Authorized Version.

Penitentiary, a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation.

Penitentiary, one of the offices of the Roman Curia, taking special cognizance of matters relating to the confessional, and dispensations from such impediments to marriage as are not diriment. The dignitary who presides over the office described above. He is a cardinal priest, and must be a doctor of theology or canon law. That part of the church to which penitents were restricted. Canon penitentiary: In the Roman Church a canon appointed in compliance with a decree of the Council of Trent which directs that in every cathedral church, if possible, a penitentiary should be appointed. He must be 40 years of age, master of arts, a doctor, or a licentiate in theology or canon law. His duty is to deal with reserved cases, and his attendance in confessional is considered equivalent to presence in choir.

Penn, John, an English miscellaneous writer; born in London, England, Feb. 22, 1760; wrote: "The Battle of Eddington; or British Liberty," a drama (1792); a volume of "Poems" (1794); "Letters on the Drama" (1796); "Vergil's Fourth Eclogue, with Notes" (1825). He died June 21, 1834.

Penn, Sir William, an English admiral who greatly distinguished himself against the Dutch in the 17th century; born in Bristol in 1621, entered the navy at an early period, and was captain at the age of 23. After the restoration he was knighted, and died in Essex in 1670.

Penn, William, founder of the State of Pennsylvania; son of the preceding; born in London, Oct. 13, 1644. He received a good education, which was completed at Christ Church, Oxford; but he disappointed his father's expectations by turning Quaker, and was discarded by him. Sir William afterward relented, and sent his son abroad. Young Penn visited France and Italy, and returned to his native country in 1664. He spent two years in the study of the law at Lincoln's Inn, and was then sent to Ireland to manage his father's estates; but, happening to hear a discourse at Cork, by Thomas Loe, a leading Quaker, he reverted to his former opinions, and traveled to propagate this new faith. He was taken up for preaching, and sent to prison; but

was released through the interest of his father. After his return to England, he was sent to the Tower, on account of a book which he had written; and, while there, he composed his principal work, entitled "No Cross, no Crown," intended to show the benefit of suffering. On his release, he resumed his former labors, and was apprehended, with some others, and tried for preaching at a conventicle in Gracechurch Street. The jury persisted in finding them not guilty, and were fined for acting contrary to the dictates of the judge. Admiral Penn was reconciled to his son before his death, and left him all his property. He continued firm in his attachment to the Society of Friends, and, in 1677, went on a mission to Holland and Germany, with Fox and Barclay. In 1681 he obtained from the crown, in lieu of the arrears due his father, the grant of the province in North America, and it was Charles II. who, in honor of Penn proposed the name Pennsylvania. The code of laws which Penn prepared for the province was exalted in aim, comprehensive in scope; yet with slender exceptions, its details were marvelously practical, and if Penn had not the genius of the ruler, he had, as few have had, the genius of the legislator. Accompanied by



WILLIAM PENN.

emigrants, Penn sailed from Deal Sept. 5, 1682, for America, and landed at New Castle, Del., Oct. 24, and at Upland, Pa., (now Chester), Oct. 29, 1682. The work of organization was rapid. A few Swedes and Dutch had previously settled in Pennsylvania, but colonists from various regions of the Old World now poured in. Universal toleration was proclaimed, a charter of liberties was solemnly consecrated, and a democratic government was established. In his dealings with the Indians and their

chiefs, Penn manifested his accustomed magnanimity and justice. The capital city, Philadelphia, was planned on a scale commensurate with Pennsylvania's expected greatness. Penn's family was in England. Hearing that his wife was ill; hearing that his friend Algernon Sidney had perished on the scaffold; hearing that the fury of fanaticism was rivalling with the fury of vice; he, intrusting his unfinished undertakings to such men as he deemed competent, hurried anxiously back. During the reign of James II. Penn was continually at court, yet from no selfish or servile reasons. James had been his father's friend, and he had always been glad and prompt to help Penn himself. Penn therefore entered the palace that he might give the king wise counsels, and counsels tending toward mercy. Confiding both in Penn's fidelity and skill, James commissioned him to visit the Prince of Orange at The Hague, to ascertain the prince's views on some points, to furnish him with clearer, correcter notions on others — a mission in which Penn succeeded indifferently. The overthrow of James was in more than one respect a misfortune for Penn. In the spring of 1690 he was arrested on the charge of holding treasonable correspondence with the dethroned monarch. The absurdity of the charge being swiftly and glaringly evident, Penn was set at liberty. Yet, though his conduct continued to be blameless, he was, by an order in council, stripped, March 14, 1692, of his title to the Pennsylvanian government — a tyrannical act involving his utter ruin; for, besides that he had risked his whole substance in the Pennsylvanian experiment, his estates, both in England and in Ireland, had been grievously mismanaged by incompetent or dishonest overseers. An order in council capriciously restored to Penn, in 1694, that Pennsylvanian government of which an order in council had so capriciously robbed him. But the ownership of territories so extensive was almost barren to him. His agents were faithless, and the colonists, though profuse in expressions of regard, were in reality ungrateful and grasping. A visit to his Irish estates preluded Penn's second expedition to the New World. His family went with him to America, though rather from necessity than choice. Penn's residence in the colony was more beneficial to the colonists than to himself. He suggested, he promoted, many reforms; above all, he inculcated and gave the example of that humane spirit in which he was so far before his age. He branded as iniquitous negro slavery, and to the aged, the sick, and the destitute he was a bountiful almoner. In 1701 he returned to England, and, being encumbered with debts, endeavored to negotiate the sale of Pennsylvania to the crown for \$60,000. This negotiation was interrupted in 1712, through his being

attacked by an apopleptic fit, which, happening twice afterward, greatly impaired his mental faculties. He survived for six years longer, but with a constitution much shattered, and quite unfitted for any serious employment. Penn died July 29, 1718; and was buried at the village of Jordan, Buckinghamshire.

Pennant, a small flag or banner. In naval affairs, a long, narrow piece of bunting, worn at the mast-heads of vessels of war.

Pennant, Thomas, an English naturalist and antiquary; born in Downing, Flintshire, in 1726, and studied at Oxford. He early devoted himself to natural history and archæology. In 1761 he published the first part of his "British Zoölogy," which gained him considerable reputation both in Great Britain and on the Continent. In 1765 he made a journey to the Continent, where he visited Buffon, Haller, Pallas, and other eminent foreigners. He was admitted into the Royal Society in 1767; and in 1769 he undertook his first tour of Scotland, where he met with a flattering reception. After a busy life of literary labor and research he took leave of the public in 1793 in an amusing piece of autobiography — the "Literary Life of the late Thomas Pennant." His chief works are "British Zoölogy" (1761-1769); "Synopsis of Quadrupeds" (1771); "Genera of Birds" (1773); "Arctic Zoölogy" (3 vols. 1784-1787); "Tours in Scotland" (1790); "Tour in Wales" (1778-1781); and "Account of London" (1790). He died in 1798.

Pennatula, an interesting animal whose quill or feather-like appearance is suggested by the title and by the popular name sea pen. It is one of the alcyonarian actinozoa, in the same sub-class as dead-men's fingers, red coral, gorgonia, etc. One species (*P. phosphorea*) is not uncommon at moderate depths (e. g., 20 fathoms) round British coasts. It consists of a basal stalk, by which the animal is probably fixed upright in the mud, and of a free axis bearing numerous polypes. The whole length is about 4-6 inches; the color is deep red, and due to pigmented spicules of lime; the living animal is brightly phosphorescent. The stalk is really a tube, and can be somewhat inflated; the polypes are fused together in sets of a dozen or so up each side of the axis. These fused sets form a series of parallel leaves, somewhat like the barbs of a feather. The median part of the axis also bears rudimentary asexual polypes ("zooids") which are not fused. The whole axis is supported by a firmly calcified internal stem. The sexes are separate. Among related forms virgularia, funiculina, and renilla are important.

Penn College, a coeducational institution in Oskaloosa, Ia.; founded in 1873

under the auspices of the Society of Friends; has grounds and buildings valued at over \$100,000; endowment funds, over \$125,000; volumes in the library, about 6,000; scientific apparatus, etc., \$15,000; ordinary income, about \$25,000; average number of faculty, 20; average student attendance, 245; graduates, over 400.

Pennell, Henry Cholmondeley, an English poet and writer on angling; born in 1837. After serving in various departments of the Admiralty, he was selected to carry out commercial reforms for the Khedive of Egypt. His poetical works are well known, among them being: "Puck on Pegasus" (1861); "The Crescent" (1866); "The Muses of Mayfair" (1874); "From Grave to Gay" (1885). On angling and ichthyology he has written: "The Angler-Naturalist" (1864); "The Modern Practical Angler" (1873); two volumes on fishing in the "Badminton Library"; articles in the "Fisherman's Magazine and Review," of which he was editor 1864-1865.

Pennell, Mrs. Elizabeth (Robins), an American writer, wife of Joseph. For many years she resided in London, and traveled extensively in Europe. Besides contributions to the "Atlantic," the "Century," and other magazines, she published numerous books, illustrated by her husband, and in some cases written in collaboration with him, the best known being: "A Canterbury Pilgrimage" (1885); "Two Pilgrims' Progress" (1886); "Our Journey to the Hebrides" (1889); "Play in Provence" (1891); "To Gipsyland" (1892); "Feasts of Autolycus" (1896); etc.

Pennell, Joseph, an American illustrator and author; born in Philadelphia, Pa., July 4, 1860. Besides works written in collaboration with his wife, he published: "Pen Drawing and Pen Draughtsmen" (1889); "The Jew at Home" (1892); "Modern Illustration"; etc.

Pennie, John Fitzgerald, an English dramatic writer; born in East Lulworth, Dorsetshire, March 25, 1782. Among his dramas are: "The Varangian, or Masonic Honor"; "Ethelred the Usurper" (1817); "Ethelwolf, or the Danish Pirates" (1821); he wrote also "The Royal Minstrel," an epic poem (1817). He died in Storborough, near Wareham, July 13, 1848.

Pennington, Alexander Cummings McWhorter, an American military officer; born in Newark, N. J., Jan. 8, 1838; was graduated at the United States Military Academy in 1860; served through the Civil War, during the latter part in command of a brigade in the Army of the Potomac, and was brevetted Brigadier-General of volunteers. After the war he served at various army posts, was promoted Brigadier-Gen-

eral, U. S. A., in 1899 and was retired Oct. 17, of that year.

Pennington, Arthur Robert, an English author; born in 1814; was graduated at Cambridge, and ordained in the Church of England in 1838. After occupying several curacies, he became vicar at Utterby, near Louth, in 1845. He wrote "The Life and Character of Erasmus"; "Preludes to the Reformation"; "From Dawn to Dark in Europe"; etc. He died in Utterby, July 19, 1899.

Pennon, or Penon, a small flag or streamer half the size of the guidon, but shaped like it, of a swallow tail form, attached to the handle of a lance or spear. Afterward it became, by increase in length and breadth, a military ensign, and was charged with the crest, badge, or war cry of the knight; his arms being emblazoned on the banner, which was in shape a parallelogram.

Pennsylvania, a State in the North Atlantic Division of the North American Union, bounded by New York, New Jersey, Delaware, Maryland, West Virginia, Ohio, and Lake Erie; one of the original 13 States; capital, Harrisburg; number of counties, 67; area, 44,985 square miles; pop. (1900) 6,302,115; (1910) 7,665,111.

Topography.—The State presents three well defined physical divisions, the E. plain, middle hills, and W. highlands. A number of parallel ridges cross it from N. to S. with a maximum altitude of 2,500 feet. The Appalachian system in Pennsylvania, aside from their general division in two ranges, the Blue or Kittatinny, and the Allegheny, is subdivided into a great number of smaller ranges, intersected by numerous broad and fertile valleys. The W. table-land, occupying one-half the area of the State, is a broad rolling plateau, gradually descending toward Lake Erie on the N. W., and has several isolated peaks. There are six distinct water basins draining the State; the Delaware, the Susquehanna, the Genesee, the Potomac, and the Ohio rivers, and Lake Erie. The Ohio is formed by the union of the Monongahela and Allegheny at Pittsburgh. The Susquehanna, though rising in New York, is a Pennsylvania river. The Delaware forms the entire E. boundary and passes through the Delaware Water Gap, a narrow gorge, whose sides rise perpendicularly, to a height of 1,200 feet. The Lehigh river joins the Delaware at Easton. This river rises in the coal region and flows through a region of magnificent scenery. Lake Erie forms 45 miles of the N. boundary of the State and has an excellent harbor at Erie.

Geology.—The geological formations of the State are of the Azoic, Mesozoic, and Palæozoic periods. The first is situated in the S. E. and is crossed by a narrow belt

Pennsylvania

of the Mesozoic. The Palæozoic formations cover the remainder of the State. Drift deposits in the shape of sand and gravel occur in the N. and N. W. counties. The Lower Silurian occurs in Lancaster, Berks, and Lehigh counties.

Mineralogy.—Pennsylvania ranks first in the United States in the amount and value of her commercial mineral products. In 1900 she ranked first in the production of coal, coke, natural gas, building stones, flint, feldspar, mineral paints, portland cement, and iron and steel products; second in petroleum and clay products; third in rock cement; and fifth in iron ores. The coal production was 79,842,326 short tons, valued at \$77,438,545. Of this, 20,831,196 short tons, valued at \$18,061,349, was used for the coke production. This industry included 169 establishments, with 32,548 ovens, and producing 13,798,893 short tons, valued at \$30,853,449. The value of the stone output was, granite, \$396,271; sandstone, \$768,794; bluestone, \$281,454; slate, \$2,713,598; marble, \$151,167; limestone, \$3,800,318; total, \$8,104,675. The flint product was 6,280 short tons, valued at \$16,030; feldspar, 11,560 short tons, valued at \$104,900; ocher, 7,601 short tons, valued at \$84,661; metallic paint, 11,376 short tons, valued at \$152,310; mortar colors, 1,160 short tons, valued at \$17,220; portland cement, 4,984,417 barrels, valued at \$4,984,417; rock cement, 687,838 barrels, valued at \$343,919; mineral waters, 1,292,950 gallons, valued at \$233,647; clay products, valued at \$14,103,245; natural gas, \$10,187,412; and petroleum, 13,258,202 barrels, valued at \$18,088,016. The production of iron ores was red hematite, 44,653 long tons; brown hematite, 232,370 long tons; magnetite, 600,066 long tons; and carbonate, 595 long tons; total, 877,684 long tons.

Over 50 per cent. of the iron and steel produced in the United States is worked in Pennsylvania, in the vicinity of Pittsburgh. This city is the center of the iron industry of the world. The production of various grades of iron and steel in 1900 were as follows: Pig iron, 6,365,935 long tons; bessemer steel ingots, 3,488,731 long tons; bessemer steel rails, 1,195,255 long tons; open hearth steel ingots and castings, 2,699,502 long tons; open hearth, acid and basic steel castings, 78,584 long tons; and wire nails, 2,158,399 kegs of 100 pounds each.

Agriculture.—As an agricultural State, Pennsylvania stands high. It ranks first in the United States in the production of rye, and has large crops of other cereals. The S. E. counties are remarkably fertile, Chester being noted for its nurseries, and Lancaster for its tobacco crop. In 1900 the principal farm crops were corn, 32,707,900 bushels, valued at \$14,718,555; wheat, 20,281,334 bushels, valued at \$14,602,560; oats,

Pennsylvania

38,000,872 bushels, valued at \$11,400,262; barley, 148,067 bushels, valued at \$74,034; rye, 4,416,299 bushels, valued at \$2,340,638; buckwheat, 3,188,402 bushels, valued at \$1,753,621; potatoes, 10,921,748 bushels, valued at \$5,788,526; and hay, 2,672,561 tons, valued at \$37,148,598. The natural forest trees include pine, poplar, beech, sugar maple, chestnut, birch, wild cherry, walnut, oak, hickory, ash, cherry, elm, sycamore, and hemlock. Considerable attention is paid to stock raising, and dairying is becoming one of the leading industries.

Manufactures.—Pennsylvania ranks second in the United States in the value of her manufactures. Besides the leading industries of coal mining, coke, iron and steel manufacture, and the production of petroleum, the State has extensive manufactures of plate and bottle glass, paper bags, rag carpets, woolen goods, glue, railroad cars, drugs, and chemicals, gunpowder, leather, and lumber. Pittsburgh, Homestead, Johnstown, and Bethlehem are noted for their extensive iron works, Pittsburgh for glass; Pittston, Hazelton, Wilkesbarre, Shenandoah, Ashland, Pottstown, and Scranton, for their anthracite coal; Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood, and Phillipsburg for their bituminous coal; Philadelphia for general manufactures, locomotives and ship building; Connellsville, for coke; Altoona and Reading for railroad cars and repair shops; and Scranton for its collieries and steel works. Other important manufacturing centers are Erie, Lancaster, Easton, Allentown, Chester, York, Oil City, Norristown, Carbondale, Pottsville, Harrisburg, Corry, Phoenixville, Bristol, and Titusville. In 1900, according to the United States census, there were 52,185 manufacturing establishments; employing \$1,551,542,712 capital, and 733,834 persons; paying \$332,072,670 for wages, and \$1,042,561,628 for materials; and having finished products valued at \$1,835,104,431.

Banking.—On Oct. 31, 1901, there were reported 519 National banks in operation, having \$81,777,997 in capital, \$47,300,253 in outstanding circulation, and \$43,649,900 in United States bonds. There were also 103 State banks, with \$8,964,662 capital, and \$110,940,890 resources; 115 loan and trust companies, with \$47,805,686 capital, and \$23,323,230 surplus; 15 mutual savings banks, with \$113,748,461 in deposits; and 28 private banks with \$1,184,589 capital, and \$296,791 surplus. The exchanges at the United States Clearing Houses at Philadelphia, Pittsburgh, Scranton, Greensburg, and Chester, for the year ending Sept. 30, 1901, aggregated \$6,910,930.844, an increase over those of the preceding year of \$980,578.861.

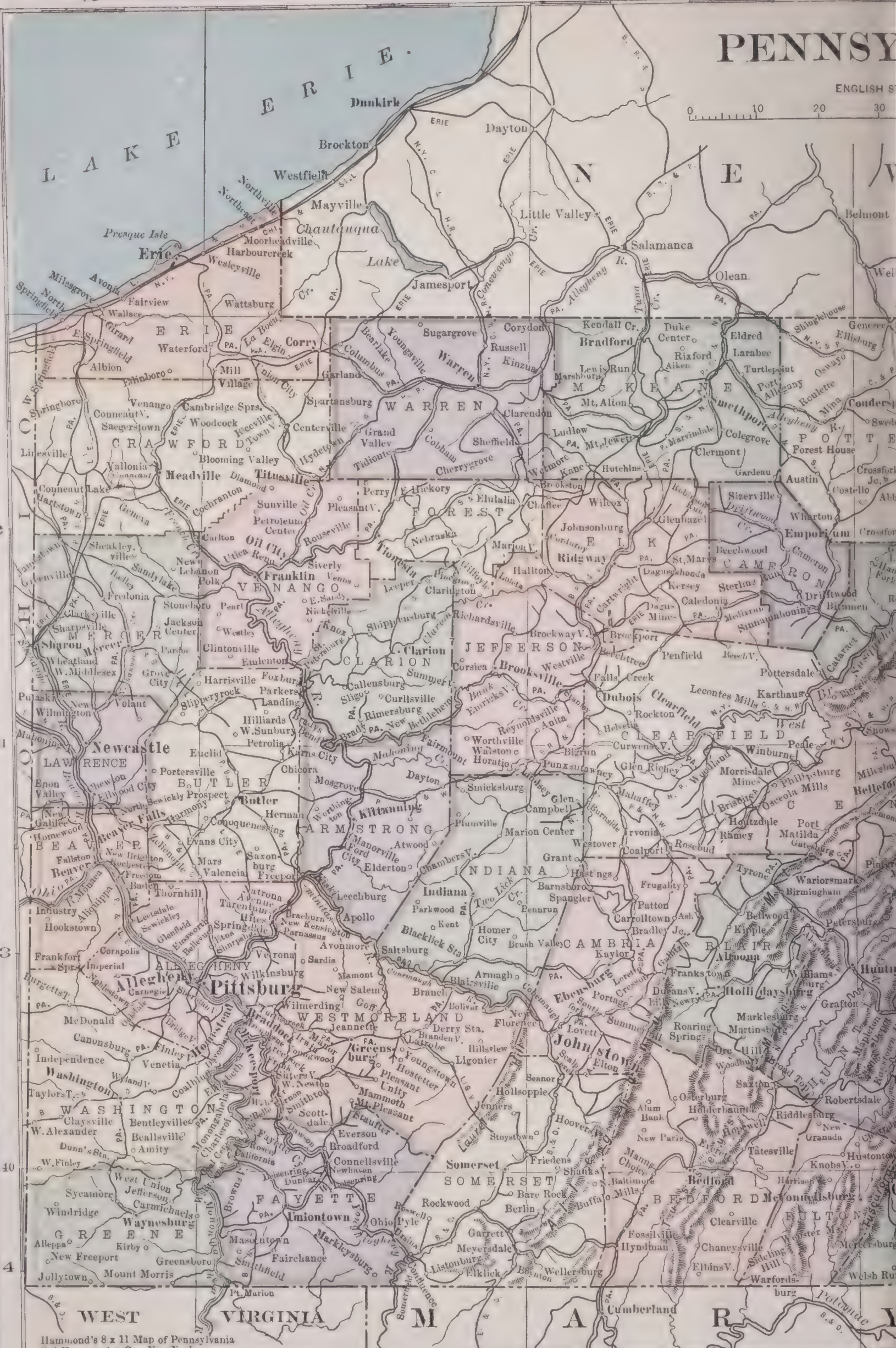
Commerce.—The imports of merchandise at the ports of Philadelphia and Erie for

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Hammond's 8 x 11 Map of Pennsylvania
C.S. Hammond & Co., New York

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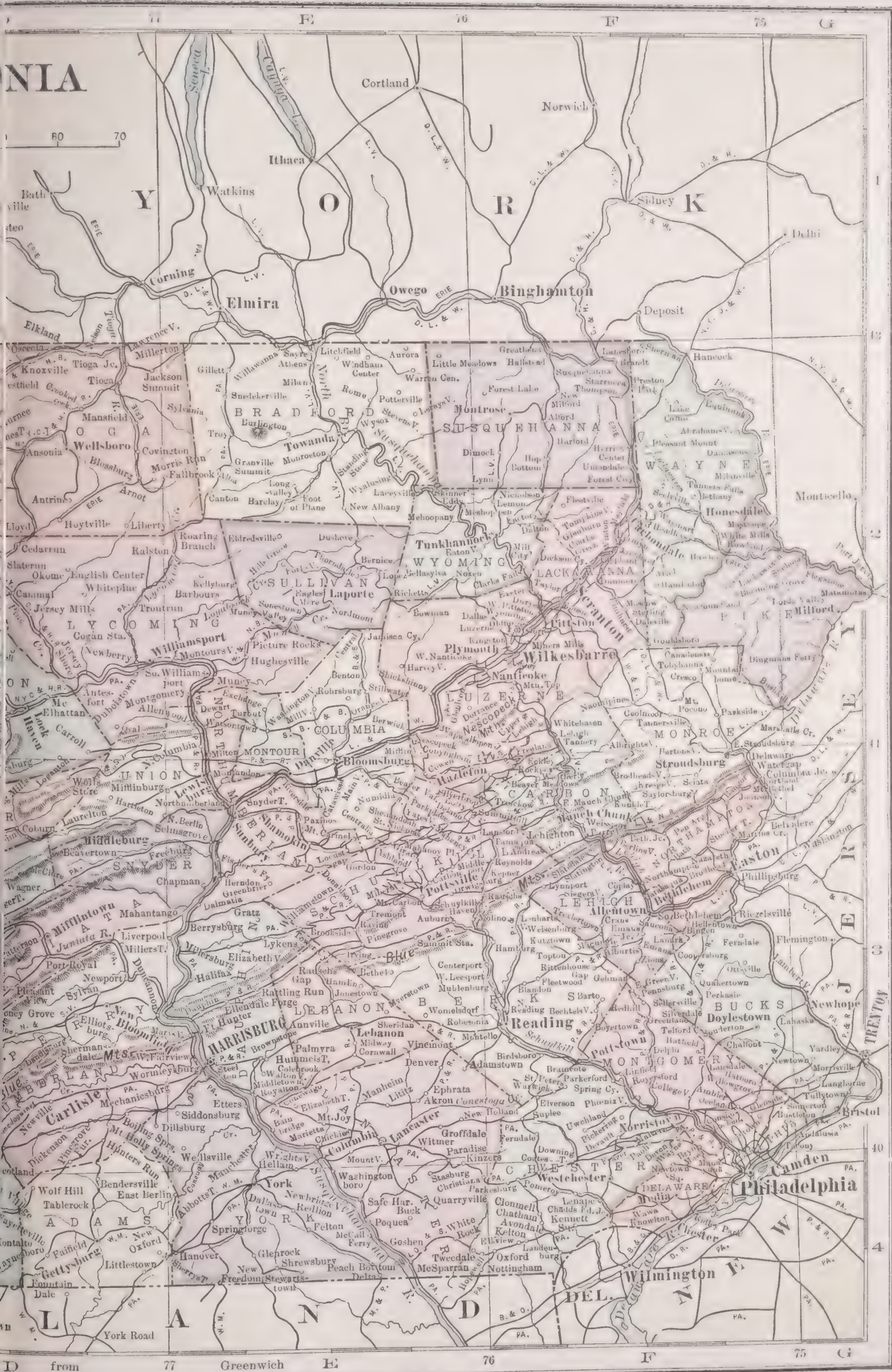
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Pennsylvania

1900 amounted in value to \$49,711,066; and the exports, \$31,364,722. The imports of gold amounted to \$9,257; silver, \$486; exports, gold, \$5,000.

Education.—At the end of the school year, 1899–1900, the children of school age numbered 1,759,300; enrolment in public schools, 1,151,880; and average daily attendance, 854,640. There were 14,932 buildings used for public school purposes, public school property valued at \$54,797,506, and 29,390 teachers. For higher education there were 302 public high schools, 131 private secondary schools, 15 public, and 4 private normal schools, 34 colleges and universities for men, and for both sexes, and 7 women's colleges. The principal colleges include, the University of Pennsylvania, at Philadelphia; Lehigh University, at South Bethlehem; Lafayette College, Easton; Bucknell University at Lewisburg; Haverford College, at Haverford; Swarthmore College, at Swarthmore; Pennsylvania State College, at State College; Dickinson College, at Carlisle; Franklin and Marshall College, at Lancaster; Washington and Jefferson College, at Washington; and the Carlisle Indian Training School, at Carlisle. The women's colleges include Wilson College, at Chambersburg; Pennsylvania College for Women, at Pittsburgh; Irving Female College, at Mechanicsburg; and the Moravian College and Seminary for Women, at Bethlehem.

Churches.—The strongest denominations in the State are the Roman Catholic, Methodist Episcopal; Presbyterian; Lutheran, General Council; Reformed; Regular Baptist; Lutheran; General Synod; Protestant Episcopal; Evangelical Association; United Presbyterian; United Brethren in Christ; and Dunkards, Conservative. In 1899 there were 9,209 Evangelical Sunday-schools, with 140,558 officers and teachers, and 1,224,571 scholars.

Postoffices and Periodicals.—In 1901 there were 5,255 postoffices of all grades; and 1,393 periodicals, of which 197 were daily, 6 tri-weekly, 35 semi-weekly, 903 weekly, 3 bi-weekly, 9 semi-monthly, 1 semi-quarterly, 7 bi-monthly, and 13 quarterly.

Railroads.—On Jan. 1, 1901, the total length of railroads within the State was 10,400 miles; of which 272 miles were constructed during the previous year.

Finances.—On Dec. 1, 1900, the total public debt of the State was \$6,815,299, including an unfunded debt of \$134,149; sinking funds, \$6,021,402; net public debt, \$793,897. The assessed valuation in 1900 was real estate, \$2,766,829,685; personal property, \$761,755,893; total valuation, \$3,528,585,578.

State Government.—The governor is elected for a term of four years and receives a salary of \$10,000 per annum. Legislative sessions are held biennially in odd years,

Pennsylvania College

beginning on the first Tuesday in January, and are unlimited in length. The Legislature has 49 members in the Senate and 205 members in the House, each of whom receives \$1,500 per annum, and mileage. There are 28 Representatives in Congress. In 1901 the State government was Republican.

History.—The country about Delaware Bay was first settled by the Swedes, but they made comparatively little progress in the occupation of the country, and passed under the English jurisdiction generally established in 1664. In 1681 the territory W. of the Delaware was granted by royal charter to William Penn who colonized it; and, by the industry and high character of the Society of Friends, by cultivating peace with the Indians, and encouraging emigration, founded a flourishing State, which, long before the Revolution, became the seat of learning, wealth, and refinement. Under the charter granted to William Penn, the region forming the present State of Delaware was included, and the two colonies continued to be so joined till the Revolution of 1776. During the War of the Revolution, Philadelphia was the chief city and capital of the federation, and Brandywine, Germantown, Valley Forge, and other points, were the scenes of memorable events, which belong to the National history. Independence was first proclaimed here, and the whole colony took a decided part in the final establishment of American liberty. In the Civil War, too, they were not less distinguished, the commonwealth sending to the National army 270 regiments and several unattached companies of volunteers, numbering in all 387,284 men. Pennsylvania was also the scene of one of the most important and most sanguinary battles of the Civil War, that of Gettysburg, the field of which has been converted into a National park, and abundantly adorned with statues and monuments. Next to the Friends, the most important immigrations were those of the Germans, who have peopled almost entirely several counties adjoining Philadelphia, and still speak the patois known as "Pennsylvania Dutch," and the Scotch-Irish, who settled in the Cumberland county region, and in many of the counties W. of the Allegheny range, and who have played a most important part in the history of the development of the State.

Pennsylvania, University of, a coeducational non-sectarian institution in Philadelphia, Pa.; opened in 1740; has endowment exceeding \$12,350,000; grounds and buildings valued at over \$6,500,000; scientific apparatus, etc., \$1,575,000; volumes in the library, over 300,000; average number of faculty, 500; average student attendance, including summer school, 4,800; ordinary income, over \$1,000,000.

Pennsylvania College, a coeducational institution in Gettysburg, Pa., founded in

Pennsylvania State College

1832 under the auspices of the Lutheran Church; has grounds and buildings valued at over \$350,000; endowment exceeding \$200,000; scientific apparatus, etc., \$30,000; volumes in the library, over 30,000; average number of faculty, 20; average student attendance, 300; ordinary income, \$35,000; graduates, over 1,600.

Pennsylvania State College, a coeducational non-sectarian institution in State College, Pa.; opened in 1859; has grounds and buildings valued at over \$1,500,000; endowment funds exceeding \$500,000; scientific apparatus, etc., \$150,000; volumes in the library, about 37,000; ordinary income, \$350,000; average number of faculty, 145; average students, 1,400.

Pennsylvania Dutch, a patois that is not, as some erroneously suppose, a corruption of German, originating in Pennsylvania, but a South-German dialect, brought from Europe, and due to a mixture of forms existing on the upper Rhine in Rhenish Bavaria, Baden, Darmstadt, Württemberg, German Switzerland, and Alsace. In the United States, but chiefly in Pennsylvania, the dialect has taken up an English element. A more correct name would be Pennsylvania German.

Penny, a British coin (formerly of copper, since 1860 of bronze) and money of account, the 12th part of a shilling. It was at first a silver coin weighing about $22\frac{1}{2}$ grains troy, or the 240th part of a Saxon pound. Till the time of Edward I. it was so deeply indented by a cross mark that it could be broken into halves (thence called half-penny) or quarters (fourthings or farthings). Its weight was steadily decreased till at last, in the reign of Elizabeth, it was fixed at 7 grains, or the 62d part of an ounce of silver. Copper pennies were first coined in 1797, but copper half-pennies and farthings had been in use from 1672. The old Scotch penny was only a 12th of a penny sterling in value, the pound being equal to 20 pennies sterling.

In the United States the term penny is commonly used for "cent," the 100th part of a dollar. It consists of 95 per cent. of copper and 5 per cent. tin and zinc. There 1,000,000,000 pennies in circulation throughout the country and the Philadelphia mint is turning them out at the rate of 4,000,000 a month to keep up the supply. Copper blank sheets are bought by the government large enough to cut 100 cents from. On reaching the mint the sheets are cut into strips, from which the round blanks called planchets are punched, and these run directly through the stamping machines. Then they go to an automatic weighing machine, which throws out all the imperfect coins. Pennies are count-

Pennyroyal

ed at the mint by a counting board which enables the operator to count 500 at a time, the board being an inclined plane with troughs the exact width of a cent, separated by copper partitions in height exactly equal to the thickness of the coin. The cents are poured over this board and fall into grooves prepared for them, the surplus ones rolling off. The board is then emptied. In 1897 Pennsylvania took the most pennies, 11,000,000. New York came next with a demand for 9,000,000, and in New Mexico, where the penny is little used, only 4,000 were asked for. It is estimated that 100,000 pennies a year are lost in various ways.

Penn Yan, a village and the county-seat of Yates co., N. Y.; situated at the foot of Lake Keuka, 45 miles N. by W. of Elmira, and on the Northern Central and the New York Central railroads. It is the center of a picturesque district famous for its vineyards. Among its principal institutions are the Penn Yan Academy and a public library. The lake furnishes excellent water-power for the manufactures, which include flour, hubs and spokes, crates, malt, and paper. Penn Yan was settled about the year 1800 by New Englanders and Pennsylvanians, and was incorporated as a village in 1833. Pop. (1900) 4,650; (1910) 4,597.

Pennypacker, Galusha, an American military officer; born in Chester co., Pa., June 1, 1844. He entered the Union ranks at the outbreak of the Civil War in April, 1861, serving as captain, then as major, and eventually becoming a brigadier-general of volunteers. He distinguished himself at Drewry's Bluff, in the attack on Petersburg, and at the assault and capture of both Fort Harrison and Fort Fisher. For bravery on the field of battle he received the Congressional medal of honor. In 1866 he resigned from the volunteer service, and was appointed a colonel in the regular army, a position he held till 1883, when he was retired on account of wounds received in war.

Pennypacker, Samuel Whitaker, an American jurist and politician; born in Phoenixville, Pa., April 9, 1843. After the Civil War, in which he served in an "emergency" regiment, he studied law at the University of Pennsylvania, and was graduated in 1866. Appointed a judge of the court of common pleas in 1889, he retained his seat until 1902, when he was elected governor of Pennsylvania. In 1904 he was re-elected. He was the author and compiler of many historical and legal volumes, and during his lifetime collected a large library of literature bearing upon the State of Pennsylvania.

Pennyroyal (*Mentha pulegium*), a species of mint, a native of Europe and West-

Pennywort

ern Asia, abundant in England and in some parts of Ireland, not found wild in Scotland, though sometimes grown there in gardens for its reputed medicinal qualities. It enjoys a high popular reputation as an emmenagogue, but no dependence may be placed in its efficacy. The name pennyroyal is given in North America to a small plant, *Hedeoma pulegioides*, allied to the mints, and having, like them, a pleasant aromatic smell and a warm pungent taste. It is much in use in domestic medicine, in the form of a warm infusion, to promote perspiration and as an emmenagogue.

Pennywort, a trailing herb (*Linaria cymbalaria*), with roundish reniform leaves, often cultivated in hanging baskets. Marsh or water pennywort is a name used for any species of the umbelliferous genus *Hydrocotyle*, low herbs with roundish leaves, growing in marshy places.

Penobscot, a river of Maine, the largest in the State, and with its two branches the most important navigable stream in New England. The W. branch rises near the Canadian frontier, and flows E. and S. E. to where it meets the E. branch or Seboois river. Afterward its course is S.S. W.; and it empties into the Atlantic Ocean through Penobscot bay, a broad and sheltered inlet 35 miles long and 20 miles wide, with numerous islands. Penobscot river is 300 miles long, and is navigable for sea-going vessels to Bangor, 60 miles from its mouth, while small steamers ply for many miles above this point.

Penobscot Indians, a once powerful tribe of American Indians belonging to the Algonkian family (see ALGONKIAN). Their original territory was the basin of the Penobscot river, Maine. They are prominent in American history by the part they played in all the colonial wars on the French side, and by their services during the Revolution in frontier fighting against the English.

Penology, literally "the science of punishment," is the term now most generally applied to the body of principles, practices, methods, and ideals accepted and applied by society for the suppression of crime and the treatment of offenders. It includes in its scope preventive agencies, criminal law, probationary, penal, and corrective methods, prison structure, discipline, and administration, the rehabilitation of offenders in society, and the disposition of the incorrigible. Some of the principles of modern penology, especially as to the application of correctional methods in the reformation of offenders, were enunciated by Plato, Jesus, the emperor Julian, and by others; but the attempt to organize them into penal and corrective systems is comparatively modern. The treatise of the Italian Mar-

Penology

quis Beccaria, "Crimes and Punishments" ("Trattato dei Delitti e delle Pene"), published in 1764, was an epoch-making work, which greatly modified criminal procedure and led to the abolition of torture and drastic punishments, and the reduction of the number of capital crimes. John Howard (*q. v.*) (born at Hackney, near London, Sept. 2, 1726) began in 1773 his inspection of English jails and prisons. In a report to the House of Commons in 1774, he described their intolerable conditions. Subsequently he made extensive tours over the continent, followed by reports on his observations. Howard's work gave an impulse to prison reform which has been felt throughout the whole civilized world. Elizabeth Fry (*q. v.*) (1780-1845), beginning by visiting prisoners in Newgate, extended her observations throughout England and Ireland, and afterward to the continent, where she was received by kings and princes. Various reformers in different countries, among whom may be mentioned Villain XIV. of Belgium, who partly anticipated some of Howard's ideas, contributed to the general development of penological science. In the last fifty years, however, the greatest progress has been realized through the development and coöperation of national and international organizations. The first societies were local and confined their activities to the improvement of prison discipline and the care of discharged convicts. The first society of this kind was formed in Philadelphia, Pa., about the time of the American Revolution and reorganized in 1787 as the Philadelphia Society for Alleviating the Miseries of Public Prisons. The Pennsylvania Prison Society is the offspring of that society. The Prison Association of New York was organized in 1845 and became influential in New York State in the improvement of laws and especially in the introduction of the reformatory system. In 1870 the National Prison Association was formed and held its meeting at Cincinnati. It was afterward reorganized, and for many years has held annual sessions in different cities of the United States. The first International Prison Congress was held in Frankfort-on-the-Main in 1846. It was formed under the inspiration and initiation of eminent penologists, such as Aubanel, Ducpétiaux, Jebb, Mittermaier, and others. Another meeting was held at Brussels in 1847, and one at Frankfort in 1857. These intermittent congresses were without permanent organization.

The first steps toward the formation of a permanent International Prison Congress originated in the United States and were due largely to the energy and influence of Dr. E. C. Wines (*q. v.*), who, under authorization of a resolution of Congress, was sent abroad by President Grant in 1871 to present personally to the governments of

Europe, to criminologists, and to the heads of penal institutions, the invitation of the government of the United States to organize an international prison congress. Dr. Wines was eminently successful in his work and secured the hearty coöperation of European officials and leading penologists. As the result of this united endeavor the existing International Prison Congress held its first meeting in London in 1872 under the presidency of Dr. Wines. Twenty governments were represented. The second congress was held at Stockholm in 1878. A permanent organization was effected and the International Prison Commission constituted as the executive arm of the Congress. The Commission meets biennially, prepares programmes, formulates questions for investigation, and serves as a medium of communication through the different countries. Quinquennial congresses have since been held in Rome, St. Petersburg, Paris, Brussels, and Budapest. No organization has had so much influence upon the penal system of Europe. La Société Générale des Prisons of France is another organization which in the last twenty-five years has promoted the development of penology in France as well as in surrounding countries. The International Union for Comparative Criminal Law also grew out of the International Prison Congress. Criminal anthropology has created another international organization, in which the new school of criminologists, headed by Lombroso, is largely represented. On the side of applied philanthropy there is also in Europe an international organization of Prisoners' Aid Societies.

The result of this organization of knowledge and endeavor throughout the world is seen in the higher standard of prison construction and administration; the improved personnel in prison management; the recognition of labor as a disciplinary and reformatory agent; the substitution of productive for unproductive labor, and to some degree the assignment to prisoners of a portion of their earnings; an improvement in prison dietaries; new and better principles of classification; the substitution of a reformatory for a retributive system; probation or conditional release for first offenders, with friendly surveillance; the parole system of conditional liberation found in its best form in the indeterminate sentence as an adjunct of a reformatory system and as a means for the protection of society; the Bertillon and fingerprint systems for the identification of prisoners; the new attention given to the study of the criminal, his environment and history; the separation of accidental from habitual criminals; the abandonment of transportation as a punishment; the humane treatment of the criminal insane; the improvement in criminal

procedure; the more effective organization of relief and protective work; and the new emphasis laid upon preventive, instead of punitive or merely corrective, measures.

The most marked difference between American and European prison systems is the existence in Europe of the cellular or separate system, the only example of which in the United States is the Eastern Penitentiary at Philadelphia. In this country the so-called Auburn system, in which prisoners work in common by day but occupy separate cells at night, still largely prevails; but several States have adopted for offenders between the age of sixteen and thirty years a reformatory system. This was first established at Elmira, N. Y., and independently developed from the systems of Maconochie and Crofton by Z. R. Brockway. The most remarkable development in criminal procedure in the United States is the establishment of children's courts, which, beginning in Chicago in 1899, have since been introduced in nearly forty cities in the United States. The probation system, developed first in Massachusetts in 1878, has been adopted in several other States and applied to both adults and juvenile offenders. The system of suspended sentence, embodying the same idea, is applied to first offenders in France and Belgium and under different conditions in England. Fundamental principles of modern penology are the protection of society by the reformation of the prisoner and the reduction of crime by removing the cause which creates it. A vast deal still remains to be done to realize this ideal.

The proceedings of the societies named above, especially those of the International Prison Congress (in French), with the reports prepared for the International Prison Commission and published as documents (in English) by the Congress of the United States, and the proceedings of the National Prison Association, twenty-six volumes of which have been indexed, constitute the largest body of information, opinion, and expert testimony on penology. Valuable statistics are published by several foreign governments and "La Revue Pénitentiaire" (published by La Société des Prisons of France) is indispensable for a study of European conditions. See also BERTILLON SYSTEM; CRIMINAL LAW; PRISON; REFORMATORY SCHOOLS, and similar articles.

S. J. BARROWS.

Penrhyn Islands, a group in the Pacific Ocean, lat. 9° 2' S.; lon. 157° 35' W. They are densely wooded and populous. The British flag was hoisted on the Penrhyn Islands in 1888.

Penrith, a market town of Cumberland, England, in a picturesque and fertile valley,

Penryn

on the outskirts of the Lake District, 18 miles S. S. E. of Carlisle. It has a fine old ruined castle, where Richard III. (then Duke of Gloucester) is said to have resided, and a grammar school (1395; refounded 1564). In the churchyard are two ancient monuments, the "Giant's Grave" and the "Giant's Thumb," often visited by Sir Walter Scott; and N. E. of the town is the wooded Beacon (937 feet). There are saw-mills, tanneries, and breweries, but the chief trade is agricultural.

Penryn, "head of the river," a town of Cornwall, England; at the head of a creek of Falmouth harbor, 3 miles N. W. of Falmouth town. Scarce a trace remains of Glasney College, founded in 1264 for 13 Black Augustinian Canons; and none of a palace of the bishops of Exeter. Neighboring quarries supply the famous Penryn granite—the material of Waterloo Bridge, the Chatham docks, and other great public works; and the town has besides some manufactures of paper, woolen cloth, gunpowder, etc. Incorporated by James I., it was taken by Fairfax in 1646.

Pensacola, a city, port of entry and county-seat of Escambia co., Fla.; on Pensacola Bay, and on the Pensacola, Alabama, and Tennessee, and the Louisville and Nashville railroads; 7 miles from the Gulf of Mexico. It has several orphans' and widows' homes, electric light plant, National banks, daily and weekly newspapers, a custom house, court house, and Marine Hospital. The city annually receives about 300,000,000 feet of yellow pine from the forests of Alabama, and ships it to all parts of the world. The other industries include the shipment of iron, coal, cotton, and naval stores. The assessed property valuation is about \$3,000,000. Pensacola was settled by Spanish colonists before 1700. In 1719 it was captured by Bienville, but soon afterward was restored. The British had possession of Western Florida in 1763-1781, and during the wars with Napoleon were permitted to hold Pensacola, and organize expeditions in its harbor. General Jackson seized the town Nov. 6, 1814, and the British withdrew, after blowing up the fort. In 1818 Jackson again seized the place in prosecution of the Seminole War, on the plea that the Spanish authorities aided the Indians. Pop. (1890) 11,750; (1900) 17,747; (1910) 22,982.

Pensacola Bay, an inlet of the Gulf of Mexico, at the W. extremity of Florida, defended at its entrance by Fort Pickens, on Santa Rosa Island, and Fort McRea on the mainland. The entrance between Santa Rosa Island and the mainland is a mile wide. Besides a lighthouse, there

Pension

are a navy yard, marine hospital and barracks, and in the vicinity the villages of Bagdad and Milton.

Pension, an allowance of money, in stipulated amounts and in periodical payments, made by government to persons in recognition of past service, military, naval, civil, or judicial. In Europe pensions are conferred on retired soldiers, sailors, judges, and civil servants, and on other distinguished personages whose achievements or services merit special recognition. The payment of pensions in the United States is regulated by special congressional enactment. The system has been in operation nearly ever since the adoption of the Federal Constitution. Pensions are generally predicated and allowed on account of some disablement which occurred in the military or naval service of the United States while in line of duty. On June 30, 1909, there were on the rolls 946,194 names. Classified by wars the pensioners then were: Revolutionary, 1; War of 1812, 395; Indian wars, 4,625; Mexican War, 9,092; Civil War, 888,690; Spanish War, 27,095. The regular army was credited with 16,296. The Revolutionary pensioner was a woman; and all the 1812 pensioners were widows. The last surviving pensioned soldier of 1812 was Hiram Cronk, who died in 1905 at the age of 105 years. The total amount paid out for pensions during the fiscal year 1908-1909 was \$161,973,703.77, and the cost for maintenance of the pension system was \$2,852,583.73. In the period of 1866-1909, the total payments for pensions aggregated \$3,816,637,069.50, and the total from the foundation of the Government to June 30, 1910, reached the enormous amount of \$4,073,056,570. The year of the largest number of pensioners was 1902, when there were 999,446 in all. The year 1909 had the smallest number on the rolls since 1892, but the total payments that year were the largest on record, \$161,973,703.

The American pension system is the most munificent and liberal to all classes of any country in the world, and in number of pensioners and the amount paid it far exceeds that of any other nation. The Pension Bureau is the largest bureau of the government. The officers and employees are as follows: One commissioner, 1 first deputy commissioner, 1 second deputy commissioner, 1 medical referee, 1 assistant medical referee, 2 expert surgeons, 38 medical examiners, 1 chief clerk, 1 assistant chief clerk, 10 chiefs of division, 1 law clerk, 20 assistant chiefs of division, 58 principal examiners, 1,304 clerks, with salaries varying from \$900 to \$1,800 per year and whose appointment is under the civil-service rules and regulations; 150 special examiners detailed for duty in the various States and Territories; 65 messen-

gers, 24 watchmen, and 62 laborers. The expenses attendant on the Bureau of Pensions approximate \$2,500,000 a year. The highest rate of pension allowed by law is \$100 a month, this being for the loss of both arms; the next highest is \$72 per month, being for loss of both feet, or total disability requiring the regular aid and attendance of another person. These disabilities are called specific disabilities. The rate fixed by law for total disabilities, not specific, is as follows: Lieutenant-colonel and all officers of higher rank, \$30 a month; major, surgeon, and paymaster, \$25 a month; captain, \$20 a month; 1st lieutenant, \$17 a month; 2d lieutenant, \$15 a month; all enlisted men, \$8 a month. By an Act of Congress the pension of a widow of an enlisted man whose death was occasioned by a disability incurred in the service, and who has not remarried, was fixed at \$12 a month, after March 19, 1886. The pension of one, who by reason of wounds or disabilities contracted in service and line of duty requires the periodical aid and attendance of another, is fixed by law at \$50 per month. Pensions have also been granted to the widows of former Presidents, Mrs. Lincoln, Mrs. Garfield, Mrs. Polk, Mrs. Tyler, and Mrs. McKinley. Private pension bills are also passed, but by far the largest number of pensioners of the United States are such under general laws. The tax on tobacco and whisky largely pays the cost of pensions, and it is asserted by the friends of a liberal pension system that as long as Congress retains the tax on these articles there will be no difficulty in meeting the amount required for the payment of pensions. The commissioner of pensions is appointed by the President, subject to confirmation by the United States Senate. H. C. EVANS.

Pensionary, one of the chief magistrates of towns in Holland. The Grand Pensionary was the first minister of the United Provinces of Holland under the old republican government.

Pentacle, a figure whose basis consists of five lines, forming a five-pointed star. It is not infrequent in early ornamental art, but was also used with superstitious import by the astrologers and mystics of the Middle Ages. Also, a piece of fine linen, folded with five corners, according to the five senses, and suitably inscribed with characters. This the magician extended toward the spirits which he evoked, when they were stubborn and rebellious, and refused to be conformable to the ceremonies and rites of magic.

Pentacrinus, in zoölogy, the typical genus of the *Pentacrinidæ*. The column is pentagonal. *P. caput medusæ* is found in the Caribbean Sea; *P. europæus* is the larva

of *Antedon rosacea*. George Jeffreys, in 1870, dredged up another species, which he called *P. wyville-thomsoni*, from the coast of Portugal, from a depth of 6,570 feet. In palæontology, seven species are known in the Lias, seven in the Jurassic, three in the Cretaceous, and three in the Eocene strata. Of these, *P. (extracrinus) briareus*, from the Lower Lias of Lyme Regis, has extraordinarily ramified arms or rays.

Pentagon, a mystic figure produced by prolonging the sides of a regular pentagon till they intersect. It can be made without a break in the drawing, and, viewed from five sides, exhibits the form of a Greek A. According to Lucian, it served the Pythagoreans for a salutation and symbol of health. In German mythology it was regarded as the footprint of swan-footed Nornen, till, as Christianity gained ground, these beings were looked on as witches and evil spirits. Henceforward, this sign was, with the sign of the cross, placed at the door to prevent the entrance of Druden and witches, but any break in the figure caused it to lose its virtue.

Pentagon, a figure of five sides and five angles; if the sides and angles be equal it is a regular pentagon; otherwise, irregular.

Pentamera, one of the primary sections into which coleopterous insects (beetles) are divided, including those which have five joints on the tarsus of each leg.

Pentamerone, a famous collection of 50 folk tales (Naples, 1637), written in the Neapolitan dialect, by Giambattista Basile, which are supposed to be told during five days by 10 old women for the entertainment of a Moorish slave who has usurped the place of the rightful princess. An admirable German translation (enriched by notes) by Felix Liebrecht appeared at Breslau in 1846. Thirty-one of the stories were translated by J. E. Taylor (Lond. 1848). The stories are of the greatest value to the student of folk tale,

Pentameter, a verse of five feet, used especially in Latin and Greek poetry, in which the first two feet may be either dactyls or spondees, the third must be a spondee, and the last two anapæsts; or it may be considered as consisting of two parts, each containing two feet and a syllable; the first half consists of two dactyls or spondees and a long syllable, the second half must consist of two dactyls and a syllable. Hexameter and pentameter verses used alternately constitute what is called elegiac measure.

Pentateuch, a term applied exclusively to the first five books of the Old Testament collectively, termed in Hebrew *torah* = the law. The first mention of the five-fold

Pentecost

division is by Josephus. It seems to have been made by the Septuagint translators, who then bestowed on the volume a Greek name expressive of what they had done. Samaritan Pentateuch, the Pentateuch in use among the Samaritans. Words which have in them *d* and *r*, and again *i* and *v*, letters unlike in the Samaritan, but very similar in Hebrew [(*d*) and (*r*), also (*i*) and (*v*)], are sometimes interchanged, showing that the work was derived from a Hebrew original. The passages attributed to Ezra are in it. It substitutes Mount Gerizim for Mount Ebal in Deut. xxvii: 4. The text in various places differs from the Hebrew, generally however agreeing with the Septuagint. The chronology also is in places at variance with that of the Hebrew Bible. If Josephus is correct as to the date of the building of the Temple on Mount Gerizim, the Samaritan Pentateuch was made probably about 330 B. C., though the popular belief is that it is much older.

Pentecost, one of the three greatest Jewish festivals. Its Greek name was given because it was held on the 50th day, counting from the second of the Passover (Lev. xxiii: 15, 16), whence it was called in Hebrew the Feast of Weeks (Deut. xvi: 9, 10). By this account the enumeration of the weeks was to be from "such time as thou beginnest to put the sickle to the corn." It was called also the Feast of Harvest, or Firstfruits of Wheat Harvest (Exod. xxiii: 16; xxxiv: 22). When it came every Jewish male had to present himself before Jehovah (Exod. xxiii: 17; xxxiv: 23). Meat or wave offerings, especially two wave loaves, and sacrifices were presented at the festival (Lev. xxiii: 16, 17, etc.; Num. xxviii: 26-31; Deut. xvi: 9-12). The Holy Spirit descended on the members of the infant Christian Church on the day of Pentecost, imparting the gift of tongues (Acts ii: 1-20). In ancient times the Pentecost lasted but a single day, but modern Judaism extends it to two. Also, Whitsuntide, a feast which, reckoning inclusively, is 50 days after Easter. It is kept in commemoration of the descent of the Holy Ghost upon the Apostles.

Pentecost, George Frederick, an American clergyman; born in Albion, Ill., Sept. 23, 1842; entered Georgetown University but left to volunteer for the Union army; was chaplain in 1862-1864, and filled various pastorates in different parts of the country in 1864-1880. In 1887 he engaged in evangelical work in Scotland and then went to India on a special mission to the English-speaking Brahmins. He was called to the First Presbyterian Church at Yonkers, N. Y., in 1897. He wrote: "Out of Egypt" (1884); "Boyhood of Christ"

Pentstemon

(1896); "Bible Studies" (10 vols. 1880-1889); etc.

Penthesilea, in Greek mythology, a queen of the Amazons.

Pentland Firth, a channel between the Atlantic and German Oceans, separating the mainland of Scotland from the Orkney Islands. It is 14 miles long and 6¼ miles broad at the narrowest. The Pentland Skerries, 5 miles N. E. of Duncansbay Head, consists of two islets and of several contiguous rocks. On the larger of the islets is a lighthouse (1794). The navigation of the Pentland Firth is more dangerous than that of any other portion of the Scotch seas, a current from W. to E. flowing through it with a velocity of from 3 to 10 miles an hour, and causing numerous eddies and whirlpools. Yet over 5,000 vessels with cargoes pass through the Firth annually.

Pentland Hills, in the Lowlands of Scotland, extend 16 miles S. W. from a point 3 miles S. of Edinburgh, through the counties of Midlothian, Peebles, and Lanark, have a breadth of 4 to 6 miles, and attain a maximum height in Carnethy (1,890 feet) and Scald Law (1,898). In the battle of the Pentlands or Rullion Green, 2 miles N. N. W. of Penicuik, Sir Thomas Dalrymple routed 900 Westland Covenanters, Nov. 28, 1666.

Pentonville, a populous district in London in the parish of St. James's, Clerkenwell; the first buildings in which were erected in 1773 on fields belonging to Henry Penton. The name has since been extended to part of the parish of Islington, in which stands the Pentonville Prison. This, the Model Prison, as it was at first called, in the Caledonian Road, was built in 1840-1842, and constructed on the radiating principle, so as to admit of thorough inspection, and contains accommodation for 520 prisoners. The treatment is designed to "enforce strict separation, with industrial employment and moral training."

Pentremites, in zoölogy, a genus of *Blastoidea*. The species were fixed to the sea bottom by a pedicle formed of solid polygonal plates, arranged in five ambulacral, and five interambulacral areas. Found in the Palæozoic, especially in the Carboniferous rocks.

Pentstemon, or **Pentestemon**, a genus of plants, order *Scrophulariaceæ*. They are perennial herbs, rarely having woody stems, branching, paniculate, with opposite leaves; and showy red, violet, blue, or white flowers. *P. pubescens*, the beard tongue, is a handsome plant growing on river banks, bluffs, hills, and barrens, in the United States.

Penumbra

Penumbra, a faint shadow thrown by a luminous body. It is brighter than the true shadow, though less so than the luminous body itself. It is a modification of the true shadow produced by the commingling with it of rays emitted by a portion of the luminous body. In an eclipse of the moon, the rays which have just grazed the edge of the earth are bent inward by the refraction of the atmosphere, besides having become tinged with a ruddy or copper hue. Falling on the moon, then in shadow, they often render it faintly visible, and though of a copper hue, yet bright enough to permit markings on its surface to be seen. Yet at this time the moon is so much behind the earth that it cannot be reached by any direct rays from the sun. In an eclipse the periods when the first and the last contact with the penumbra will take place are always carefully noted.

Penzance, a town of Cornwall, England; at the head of Mount's Bay, 10 miles E. N. E. of Land's End, 80 W. by S. of Plymouth, and 328 W. S. W. of London. Standing on a finely-curved shore, surrounded by rocky eminences, it is famous for its mild, equable climate, though the annual rainfall is heavy (43 inches). Its fine esplanade commands splendid land and sea views; and its chief buildings, constructed largely of granite, include a market hall (1837) with a statue before it of Sir Humphry Davy, an infirmary (1874), a postoffice (1883), and public rooms (1867), Italian Renaissance in style, and comprising a guildhall, museum, library, etc. The harbor has two piers (1772-1845) half a mile long, forming a tidal basin of 21 acres; and docks have been added since 1882. Penzance is a headquarters of the mackerel and pilchard fisheries; market gardening is an important industry; and of recent years the place has grown much in favor as a watering place. Burned by Spaniards in 1595, and sacked by Fairfax in 1646, it was incorporated in 1614, and from 1663 to 1838 was one of the five "coinage towns."

Peonage, a system of agricultural servitude common in Mexico, and some other parts of Spanish America. The peon in debt to his employer was by the Spanish colonial system bound to labor for his employer till the debt was paid. Peonage in New Mexico was abolished by Act of Congress in 1867; it was also abolished in the Argentine Republic.

Peony, a genus of plants belonging to the natural order *Ranunculaceæ*, and very generally cultivated in gardens for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large deeply-lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish,

Peoria

pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, *P. Moutan*, a native of China, of which several varieties, with beautiful whitish flowers stained with pink, are cultivated in gardens. The roots and seeds of all the species are emetic and cathartic in moderate doses. *P. officinalis* or *festiva*, the common peony of cottage gardens, was formerly in great repute as a medicine.

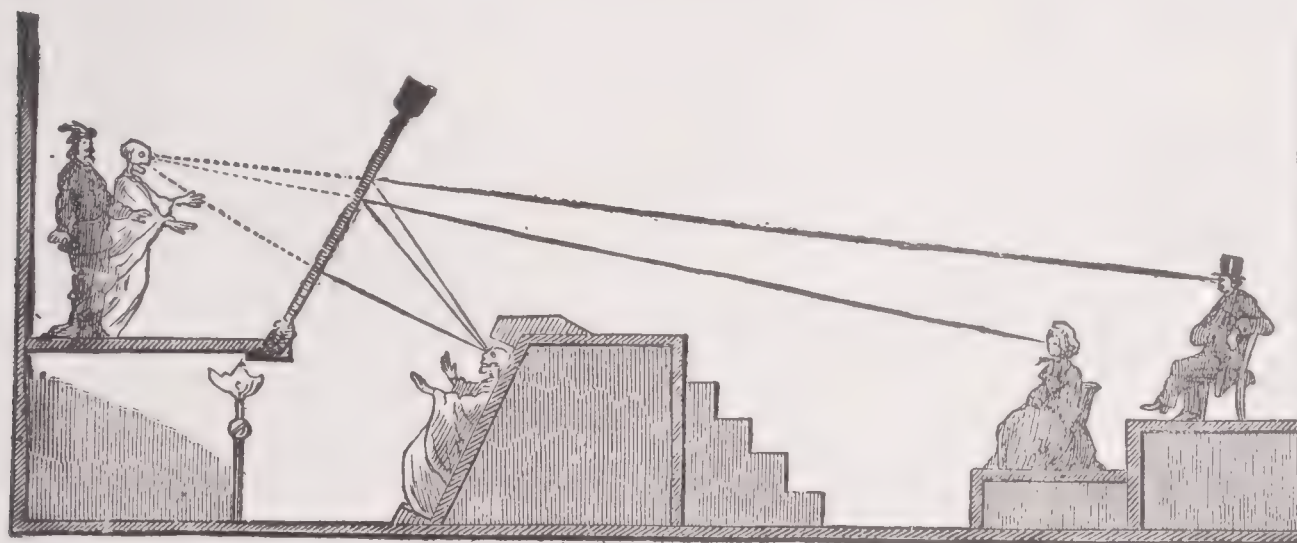
People's Palace, an institution at Mile End Road, London, intended as a center for amusement and recreation, and of association as well, for the inhabitants of the East End of London. It comprises a large hall, technical schools, art galleries, concert rooms, a library, reading and recreation rooms, swimming bath, gymnasium, etc. It is the revival and development of an idea of the Beaumont Philosophical Institute; but the idea was first amplified and made really popular in Besant's novel, "All Sorts and Conditions of Men" (1882). The buildings were inaugurated by Queen Victoria, May 14, 1887, and work was begun on Oct. 3. The Queen's Hall, which is 130 feet long by 75 feet wide, can seat 2,500 people. Around the hall are the statues of 22 queens, and a large organ at the N. end. The technical and handicraft schools in 1890 were attended by 5,000 pupils; they owe their foundation to the Drapers' Company of London, which has contributed in all about \$300,000 to the People's Palace. Cheap concerts, at from two to six cents admission, have been well patronized, as also the picture exhibitions, swimming tank, gymnasium, and dances.

Peoria, a city of Illinois, county-seat of Peoria co., and second city of the State; on the Illinois river, and on the Chicago, Peoria, and St. Louis, the Chicago and Alton, the Chicago, Rock Island, and Pacific, and other railroads; 160 miles S. W. of Chicago. It is at the foot of Peoria Lake, an expansion of the Illinois river, and occupies a broad plateau extending back to high bluffs on which are many fine residences. It has a fine system of parks and drives, over 50 miles of paved streets, water works, electric light and street railroad plants, a high school, 18 graded schools, a manual training and commercial school, kindergartens, 75 churches, a public library, a law library, hospitals, 14 banks, and 8 newspapers. Here are the Bradley Polytechnic Institute, the Spalding Institute, and homes for the friendless and the aged. There are many public buildings, conspicuous among them being the city hall, court house, post office, government revenue building, and the Coliseum. Peoria is a noted industrial city. It has immense manufactories of agricultural implements, large distilleries, foundries and machine shops, planing mills,

flour and grist mills, glucose factories, straw-board mills, rolling mills, stockyards, meat-packing plants, carriage and wagon factories, grain elevators, etc. According to the United States Census of Manufactures of 1905, 265 establishments employed \$22,243,821 of capital and 5,998 wage-earners, paid \$3,306,893 in wages, used materials costing \$16,050,664, and turned out products valued at \$60,920,411. Near the site of Peoria, in 1680, La Salle built Fort Crèvecoeur, which was soon abandoned. Toward the end of the eighteenth century a settlement was made here by French traders. This was broken up in 1812, and a new colony succeeded in 1819. Peoria was incorporated as a city in 1845. Pop. (1890) 41,024; (1900) 56,100; (1910) 66,950.

Peperine, a volcanic tuff consisting of a

matra, Malacca, and Borneo, and is named after the locality from which derived; thus, Penang, Malabar, Sumatra, Trang, etc. The ground peppers of commerce are generally mixtures of different kinds of berries; *e. g.*, Malabar is used to give weight, Penang or Trang to give strength, and Sumatra to give color. Pepper contains an alkaloid, a volatile oil, an acrid resin, together with starch, gum, albumin, etc. The ash in ground black pepper should not exceed 5 per cent., in white pepper 3 per cent. Long pepper (*P. longum*), which belongs to the same natural order, and contains almost the same constituents, must be considered a true pepper, though of less value commercially. Pepper has been adulterated, more or less, for the last 200 years, the adulterants being rice and rice husks, lin-



PEPPER'S GHOST.

conglomerate of large crystals and crystal fragments. The term was first applied to the tuffs of the Alban mountains, near Rome.

Pepin, The Short, a King of France, the first of the Carolingian kings. He was at first mayor of the palace under Childeric III.; but in 752 he dethroned that monarch and confined him in a monastery. Having requested and obtained the sanction of the Pope, Pepin was constituted king. He assisted Pope Stephen III. against the Longobards, defeated the Saxons, Bavarians, and other German nations, and united Aquitaine to his crown. After a reign of 16 years, he died in St. Denis, in 768. His son Charlemagne succeeded him as King of the Franks.

Pepin, grandson of Charlemagne, and son of Louis le Debonnaire, became King of Aquitaine in 817. He died in 838 or 839.

Pepper, the dried immature fruit or berry of *P. nigrum*, used as a condiment, whole or ground. White pepper is the berry deprived of its outer husk. It is imported into this country chiefly from Java, Su-

seed meal, mustard husks, wheat flour, sago flour, ground date, and olive stones, bone dust, chalk, etc., together with variable quantities of cayenne to restore the pungency. All these adulterants may be readily detected by the microscope.

Pepper, John Henry, an English chemist and mechanical inventor; born in Westminster, England, June 17, 1821; was appointed analytical chemist at the Royal Polytechnic in 1848, and wrote several handbooks of popular science. He is best known as the improver and exhibitor of "Pepper's Ghost," in its earliest form the invention of Henry Dircks, a device for associating on the same stage living persons and phantoms to act together. The phantom is produced by a large sheet of unsilvered glass on the stage, practically invisible to the spectators, which reflects to them, along with a visible actor or actors, the appearance of another actor on an understage, who is himself invisible. Pepper traveled with this show in the United States and Australia, and became public analyst in Brisbane, Queensland.

Peppercorn

Peppercorn. See PURPLES.

Peppercorn Rent, a nominal rent of one peppercorn a year, to be paid on demand; an acknowledgment of tenancy when lands or houses are let virtually free of rent.

Peppermint, *Mentha piperita*, a mint with oblong, lanceolate, serrate, glabrous leaves; pedicels and flowers nearly smooth; flowers in cylindrical spikes, interrupted below. Probably a garden form of *M. aquatica*. Oil of peppermint, the oil distilled from the fresh flowers of *M. piperita*. It enters into the composition of peppermint water, essence of peppermint, and spirit of peppermint. It is stimulant and carminative, and is used to correct flatulence and griping in the intestinal canal, and to mask the nauseous taste of some medicines.

Peppermint Tree, *Eucalyptus piperita*, a tree about 30 feet high, from New South Wales. The name is also given to other Eucalypti.

Pepper-pot, a celebrated West Indian dish, of which casareep is a principal ingredient; and along with it flesh or dried fish, vegetables, chiefly the unripe pods of the ochro, and chillies.

Pepper Root (*Dentaria diphylla*), a perennial herbaceous plant, of the natural order *Cruciferae*, a native of North America, with pairs of ternate leaves, and racemes of white flowers; the root of which has a pungent mustard-like taste, and is used as a condiment.

Pepsin, an azotized ferment, related to the proteids, and contained in gastric juice. It possesses the power, in conjunction with hydrochloric acid, of dissolving the insoluble proteids and converting them into peptones. Pepsin is prepared from the stomach of the pig or calf on a commercial scale, and is usually employed in the form of pills or dissolved in wine.

Peptone, the products of the action of pepsin, or acid gastric juice on albuminous substances. They are only found in the stomach and small intestines, are highly diffusible, readily soluble in water, and are not coagulated with boiling. They are not precipitated by acids, but corrosive sublimate with ammonia gives precipitates.

Pepys, Samuel, an English author, secretary to the admiralty in the reigns of Charles II. and James II.; born in Brampton, Huntingdonshire, in 1632, and educated at Cambridge. He early acquired the patronage of Sir Edward Montagu, afterward Earl of Sandwich, who employed him as secretary in the expedition for bringing Charles II. from Holland. On his return he was appointed one of the principal officers of the navy. In 1673, when the king took the admiralty into his own hands,

Perak

Pepys was appointed secretary to that office, and performed his duties with great credit. During the excitement of the Popish Plot he was committed to the Tower, but was after some time discharged without a trial, and reinstated in his office at the admiralty, which he held till the abdication of James II. He was president of the Royal Society for two years; but his title to fame rests upon his "Diary" (1659-1669), which is a most entertaining work, revealing the writer's own character very plainly, giving an excellent picture



SAMUEL PEPYS.

of contemporary life, and of great value for the history of the court of Charles II. It is in shorthand, was discovered among a collection of books, prints, and manuscripts bequeathed by Pepys to Magdalene College, Cambridge, and was first printed in 1825. He died in 1703.

Pequods. See PEQUOTS.

Pequot, Fort, an old Indian fort on Pequot Hill, about 8 miles N. E. of New London, Conn.

Pequots, or **Pequods**, a tribe of American Indians, a branch of the Mohicans, were warlike and powerful in the country round the Thames river when Connecticut was first settled, and made treaties with the Dutch and English. Hostilities, however, broke out in 1637, and the tribe was cut to pieces and scattered; yet a few descendants may be found at Green Bay, Wis.

Peræa, a term applied to many districts beyond a river or sea; most frequently to great part of Palestine beyond the Jordan.

Perak, a Malay State on the W. side of the peninsula of Malacca, under the protection of Great Britain since 1874; estimated area, 7,950 square miles. The interior ranges up to 8,000 feet. The soil is fertile, and for the most part covered with luxuriant vegetation. Elephants, leopards,

Perambulation

huge snakes, and deer swarm in the forests of the interior. The soil produces rice, sugar, tobacco, coffee, tea, vanilla, and spices. But the principal production of the state is tin. Lead also exists in great quantity. The capital is Kwala Kansar. Taiping and Kinta are the principal tin mining towns. There are over 70 miles of railway. The British have made many miles of good roads since they began to govern the country. The murder of J. W. Birch, the first British resident, in 1875 necessitated a punitive military expedition in 1876. The State is now in a highly prosperous condition, exporting to the annual value of \$15,000,000, and importing to \$10,000,000.

Perambulation, the act of perambulating, walking, or passing over or through; a wandering about; a survey or inspection made by traveling. A survey of the boundaries of a parish, district, etc., made annually by the minister, church wardens, and parishioners about Ascension week, to fix and preserve the bounds. It is also called "beating the bounds."

Perception, the reception of knowledge through the senses, and the faculty by which knowledge is so received and communication maintained between the subject and the external world. Perception differs from conception, in dealing with things that have an actual, not merely a possible existence; and from consciousness, in that it is concerned with objects external to the mind of the percipient. It is, in brief, the taking cognizance of impressions received by the senses.

The word perception is, in the language of philosophers previous to Reid, used in a very extensive signification. By Descartes, Malebranche, Locke, Leibnitz, and others, it is employed in a sense almost as unexclusive as consciousness in its widest signification. By Reid this word was limited to our faculty acquisitive of knowledge, and to that branch of this faculty whereby, through the senses, we obtain a knowledge of the external world. But his limitation did not stop here. In the act of external perception, he distinguished two elements, to which he gave the name of perception and sensation. He ought, perhaps, to have called these perception proper and sensation proper, when employed in his special meaning; for, in the language of other philosophers, sensation was a term which included his perception, and perception a term which included his sensation.

Perceval, Spencer, an English statesman, second son of the second Earl of Egmont; born in London, Nov. 1, 1762. He was educated at Harrow and Trinity College, Cambridge, and was called to the bar

Percussion

at Lincoln's Inn in 1786. He soon obtained a reputation as a diligent lawyer, and in 1796 he entered Parliament for Northampton, and became a strong supporter of Pitt. In the Addington administration he was made solicitor-general in 1801 and attorney-general in 1802, and in the Portland administration of 1807 he became chancellor of the exchequer, and was even then the real head of the government, being much trusted by George III. for his steadfast opposition to the Catholic claims. On the death of the Duke of Portland in 1809 Perceval became premier also, and retained office till his tragic death, May 11, 1812, when he was shot dead entering the lobby of the House of Commons.

Perch, *Perca fluviatilis*, the river perch. The upper part of the body is of a warm, greenish-brown tint, becoming golden on the sides, and white on the belly; there are always broad, vertical, dark bands passing down the sides. The perch is generally distributed over America, Europe, and Northern Asia, frequenting still waters, and sometimes descending into brackish waters. Perch feed on smaller fish, insects, and worms. The female deposits her eggs, united by a viscous matter, in long bands, on aquatic plants. The Great Lakes in the United States abound in perch.

Perchloric Acid, (ClHO_4) a colorless liquid obtained by distilling potassium perchlorate with sulphuric acid. Sp. gr. = 1.782 at 15.5°; does not solidify at -35°. Its vapor is transparent and colorless, but in contact with moist air it forms dense white fumes. When brought in contact with organic substances, it explodes with great violence.

Percival, James Gates, an American poet and scientist; born in Kensington, Conn., Sept. 15, 1795. During his career he was a Professor of Chemistry at the United States Military Academy, army surgeon, botanist, and State geologist of Connecticut; but will be best remembered as a poet. His chief works are: "Prometheus" (1820); "Clio" (1822), prose and verse; "Dream of a Day" (1843). He died in Hazel Green, Wis., May 2, 1856.

Percussion, a method of physical examination, performed by gently striking some part of the body—especially the chest or the abdomen—with the fingers of an instrument, to ascertain its healthy or diseased condition. Piorry advocated mediate percussion; that is, with a solid body which was a good conductor of sound interposed between the hand of the examiner and the part explored. Also in music, an ingenious contrivance whereby a hammer strikes the tongue of a reed and sets it in motion simultaneously with the admission of air

Percussion

from the wind chest, thus securing the rapid speech of the reed. Were it not for the percussion, the reed would be only gradually set in motion by the admission of the current of air, and the sound would not instantly follow the striking of the key. It is commonly used in cabinet organs, but has also been applied to the largest reeds of a church organ.

Percussion, Center of. See CENTER.

Percussion Caps, small copper cylinders, closed at one end for conveniently holding the detonating composition which is exploded by percussion so as to ignite the powder in certain kinds of firearms. The copper cap came into general use between 1820 and 1830.

Percy, the name of a noble family who went to England with William the Conqueror, and whose head, WILLIAM DE PERCY, obtained 30 knights' fees in the N. of England. A descendant, also named WILLIAM, who lived in the early part of the 12th century, left behind him two daughters, the elder of whom died childless, and the younger, Agnes, married Josceline of Lorain, brother-in-law of Henry I., who assumed the surname of his bride. His son, RICHARD DE PERCY, was one of the 25 barons who extorted Magna Charta from King John. His great-grandson, HENRY, LORD PERCY, was created Earl of Northumberland in 1337. He was marshal of England at the coronation of Richard II., against whom, however, he took up arms, and succeeded in placing the crown on the head of the Lancastrian aspirant, Henry IV. He took up arms against this king also, but his forces were beaten at Shrewsbury (1403), where his son, Henry Percy (Hotspur), fell; and again at Barnham Moor (1407-1408), where he himself fell. His titles were forfeited, but were revived in favor of his grandson HENRY, who was appointed lord high constable of England, and who fell fighting in the Lancastrian cause at St. Albans (1453). For the same cause his son and successor shared the same fate at Towton (1461). The 4th earl was murdered during a popular rising, caused by his enforcing a subsidy ordered by the avaricious Henry VII. The 6th and 7th earls fell by the hands of the executioner in the reigns of Edward VI. and Elizabeth respectively. The 8th died a violent death in the Tower, where he was confined on a charge of taking part in a plot in favor of Mary of Scotland. ALGERNON, the 10th earl, took part in the civil war against Charles I., and afterward used all his influence to bring about the Restoration. JOSCELINE, the 11th earl, died without male issue; his only daughter married Charles, Duke of Somerset, and became the mother of ALGERNON, DUKE OF SOMERSET,

Perekop

who was created Earl of Northumberland, with remainder to his son-in-law, SIR HUGH SMITHSON, a Yorkshire baronet of good family. The latter succeeded to the earldom in 1750, assuming the name of Percy, and in 1766 received the ducal title. The present duke thus represents the female line of the ancient historical house.

Percy, Thomas, an English poet; born in Bridgenorth, Shropshire, April 13, 1728 or 1729; was a minister of the English Church; was made dean of Carlisle in 1778, and bishop of Dromore in 1782. He made a collection of old popular ballads and songs, published under the title "Reliques of Ancient English Poetry" (1765), which ultimately transformed English poetic style and matter. He wrote the ballad "The Hermit of Warkworth," and the song "O Nanny, Wilt Thou Gang wi' Me?" He died in Dromore, Ireland, Sept. 30, 1811.

Percy Anecdotes, a collection of extraordinary popularity, published in monthly parts (1820-1823) by "Sholto and Reuben Percy, Brothers of the Benedictine Monastery of Mount Benger." Their real names were Thomas Byerley (died 1826), first editor of the "Mirror," and Joseph Clinton Robertson (died 1852), projector and editor of the "Mechanics' Magazine"; the work owed its name to the Percy coffee house in Rathbone Place, their usual place of meeting during its progress. An edition was prepared by John Timbs (1868).

Pereira, Jonathan, an English pharmacologist; born in Shoreditch, London, May 22, 1804, and was successively lecturer on chemistry and physician to the London Hospital (1841). Elected a Fellow of the College of Physicians in 1845, he acted as examiner in Materia Medica and Pharmacy from the establishment of the London University till his death, Jan. 20, 1853. His books were "Elements of Materia Medica" (1839-1840), and treatises on "Diet" and on "Polarized Light" (1843).

Pereira da Silva, Joao Manuel, a Brazilian historian; born in Rio de Janeiro, in 1818. He wrote: "History of the Founding of the Empire of Brazil" (1864-1868); "Brazilian Plutarch" (2 vols. 1866); "Jerônimo Corte-Real"; "Portuguese Literature: Its Past and Present" (1866); "Second Period of the Reign of Dom Pedro I. in Brazil" (1875); "History of Brazil during the Minority of Dom Pedro II., 1831-1840" (1882); "Epic Poetry" (1889).

Perekop, Isthmus of, in S. Russia, connecting the peninsula of the Crimea with the mainland of European Russia. In the N. of the isthmus is the small town of Perekop.

Perennial

Perennial, lasting or continuing without cessation throughout the year; hence, perpetual; unceasing; never failing; as perennial fountains. Continuing without intermission, as a fever.

In botany, one of those plants whose roots remain alive more years than two, but whose stems flower and perish annually. Gardeners generally call them herbaceous plants. They differ from annuals and biennials, not only in the time of their duration, but also in this, that the two former perish as soon as they have flowered, the act of reproduction exhausting their vital energies. Notwithstanding this distinction, it is not at all times easy to say whether the plant is a perennial or not; as, for instance, in the American aloe, *Agave Americana*. This plant is herbaceous, and lives for many years; but when it flowers it dies; so that in one respect it is annual, its whole life being regarded as only one season of growth; in another respect it is truly perennial. Such perennials are called by De Candolle monocarpic.

Perennibranchiata, in zoölogy, a group of the sub-order *Ichthyoidea*. There are two families, *Sirenidae* and *Proteidae*, sometimes a third, *Menobranchidae*, is doubtfully added. They have long bodies, short limbs, the hinder pair sometimes absent; branchiæ and gill-clefts persistent in all. Usually there are superior maxillary bones, and the palate is armed with teeth.

Perey, Luce (pār-ā), pseudonym of LUCE HERPIN, a French critic and essayist; born in Carouge, Switzerland, in 1832. Her best works are: "A Woman of the World in the 18th Century: The Youth of Madame d'Epinaï"; "The Last Years of Madame d'Epinaï"; and "The Private Life of Voltaire at Délices and at Ferney."

Perez, Antonio, a Spanish statesman and historian; born in 1539. His principal work is "Relations of Antonio Perez, Secretary of State of Philip II." (1589). As revealing the secrets of Philip II.'s life as a king and a man, it had a wide circulation: from this work was made up a volume of "Aphorisms of Antonio Perez"; also a volume of "Noteworthy Passages Taken from the Writings of Don Antonio Perez" (1602). He died in Paris, Nov. 3, 1611.

Perez, Pedro Ildefonso, a Mexican poet; born in Merida, Yucatan, Jan. 23, 1826; wrote: "The Martyrs of Independence"; "The Prison of Life"; "The Smuggler," a tragedy. He died Feb. 21, 1869.

Perez de Zambrana, Luisa, a Cuban story-writer and poet; born in El Cobre, near Santiago, in 1837. She wrote the novels "Angelica and Stella," and "The Ex-

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cutitioner's Daughter"; several of her poems were translated into Italian and French.

Perfall, Karl, Baron von, a German author; born in Landsberg on the Lech, Germany, March 24, 1851. Under the pseudonym "Theodor von der Ammer," he wrote "Munich Pictures: Humor and Satire from Isar-Athens" (2d ed. 1878); and under his own name the novels "Ghosts of Quality" (1883); "Wedding of Herr von Radenau" (1884); "Viscountess Bossu" (1885); "The Langsteiners" (1886); "Natural Love" (1890); "The Devout Widow" (2d ed. 1890); "Lost Eden: Holy Grail" (1894); "The King's Darling" (1895).

Perfectibilist, a generic designation for any Christians holding the doctrine that perfection is attainable in this life. This doctrine is often supported by a reference to I Cor. ii: 6; but there the perfect are those admitted to the highest grace, the Eucharist. But many divines have held that by contemplation and devotion the soul becomes so united to God that all that is sinful in it is annihilated, and it participates in the divine perfection. This was held by the Molinists, the Jansenists, the German Mystics, from whom it passed to the English Methodists.

Perfectionist, in ecclesiastical and Church history, one who believes in the possibility of living without sin; a perfectabilist. Any member of an American sect of Antinomian Communists, which was founded about 1854, by John Humphrey Noyes, who had been an Independent minister at Yale College. He professed to have discovered from the writings of St. Paul that all Christian sects were in spiritual darkness, and determined to establish a church of his own. He founded a community at Oneida, N. Y., and others subsequently at Wallingford, New Haven, and New York, in order to carry out what he asserted to be a divinely revealed system of society, based on the following principles: (1) Reconciliation with God; (2) salvation from sin; (3) brotherhood of man and woman; and (4) community of labor, and of its fruits. They are called also Bible Communists. See NOYES, JOHN HUMPHREY.

Perfumes, substances emitting an agreeable odor, and used about the person, the dress, or the dwelling, having also some value as disinfectants. Perfumes of various sorts have been held in high estimation from the most ancient times. The Egyptians, Hebrews, Phœnicians, Assyrians, and Persians are known to have made great use of them, as did also the Greeks and Romans. In the Middle Ages France and Italy were most conspicuous for the use and preparation of perfumes. Perfumes are partly of animal, but chiefly of vegetable origin.

Perfumes

They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as musk, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances made up according to recipe. At the present time the manufacture of perfumes is chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the S. of France. Certain districts are famous for certain productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine; Nîmes for thyme, rosemary, and lavender; Nice for the violet and mignonette. England claims the superiority for her lavender, which is cultivated on a large scale at Mitcham in Surrey.

Their Antiquity and Uses, with Formulae.—The employment of spices and dried flowers as perfumes is of very ancient origin, and probably their use as such dates back from the very earliest period of the existence of mankind. The art of extracting and fixing the evanescent molecules of fragrant odors emitted from aromatic and sweet-smelling substances is of more recent origin, and we are indebted to the enterprise and ingenuity of the modern chemist for those delicate odors which he in his laboratory is able to call forth by the union of certain elements, and which resemble and almost rival the old-time perfumes distilled from flowers. The perfume—considered in its more extended sense—of plants usually consists of the essential oil or gum resin contained in their stems, leaves, flowers, seeds, etc.; these are always agreeable and aromatic. The synthetic perfumes of the chemist are more often derived from substances which cannot be described as fragrant, such material as the refuse of gasworks and the drainage of manure heaps being laid under contribution for the exercise of his skill. This fact excites astonishment when first expounded, but on thoughtful consideration, amazement gradually glides into wonder, and then wonder merges into admiration, till at last we arrive at the dead level of everyday thoughts. Science, after all, only accomplishes by known methods that which is performed by plants and animals by a process which is but imperfectly understood. Thus, the scientific chemist employs the same substances as the plants—the philosopher reveals his process, nature refuses to divulge her secret, and it becomes a question which is the more wonderful of the two.

The word perfume has a very wide signification, and is applied to all pleasant odors. Originally it had a more limited meaning. It is derived from the words *per fumum*, which signify any sweet-smelling sub-

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stance given off with the smoke. Thus, myrrh of the sacred oracles—which is considered to be the produce of *Amyris commiphora*, commonly termed Indian bdelium, or false myrrh—was used, mixed with other gum resins and with spices, as incense nearly 3,700 years ago; and we find Moses referring to it in Gen. xxxvii: 25, where he tells us that a company of Ishmaelites came from Gilead with their camels, bearing spicery and balm and myrrh, going to carry it down to Egypt. It is peculiarly interesting to note the derivation of the word myrrh as fabulously related by the ancient poets, who inform us that the plant received its name from Myrrha, the daughter of Cinyras, King of Cyprus, who became enamored with her own father, and, after having accomplished her desire, fled to Arabia, where she was transformed into a tree, which still continues to be known by her name.

At a much later period mention is made of the Queen of Sheba giving abundance of spices and the wood of almug trees to Solomon. Though the almug tree is unconnected with the subject under consideration, it may interest the curious to point out that it is thought by some that this tree is a species of ebony, or Brazil-wood tree; others consider that the red sandalwood tree of India, *Pterocarpus santalinus*, Linn. (N. O. *Leguminosæ*), was designated by that name. Probably the latter supposition is correct, as the wood is close grained, hard, and of a fine red color, and thus peculiarly adapted for the uses to which it was put—such as the formation of pillars for the temples, and also for inlaying of harps and other stringed musical instruments used by the Hebrews.

The white sandalwood, *Santalum album*, Linn. (N. O. *Santalacæ*), was and is, highly valued on account of its fragrance, and the Chinese at the present day burn it in their temples in honor of their gods. And so, throughout the ancient Hebrew writings, we find reference being constantly made to the employment of odoriferous substances in some form or other, frequently under the term spicery. These substances were not always employed for the sake of their sweet-smelling properties alone; they had other very definite uses and the ancients readily recognized this. Thus the Hebrews seasoned their meat with spice; with it they imparted what flavor they chose to their wines, perfumed their women, fumigated their beds and their clothes, and with it they also embalmed their dead bodies. From this it will be seen that spicery in those days embraced any aromatic substance.

The fragrant gums, stacte, onycha (a species of wing shell which when burnt gives off an aromatic odor somewhat resembling the odor of musk), galbanum, with frankin-

cense, were ingredients of the sacred perfume of the Jews, and their holy ointment was composed of calamus, myrrh, cinnamon, and pinguis. These are believed to be the most ancient formulæ for odorous compounds on record. Pliny mentions potpourri, and refers to stacte as a spontaneous liquid exudation of the myrrh tree. Musk is noticed by Aëtius, a Greek who flourished about the end of the 5th century, and who held the post of physician to the court of Constantinople. This animal secretion is not referred to by any earlier author. It is said that the potpourri Frangipanni was invented by Mutio Frangipanni, one of the earliest of the Roman nobles and a renowned alchemist, the plant whose scent he wished to imitate being known to botanists as *Plumeria alba*. The ancient Egyptians buried with their dead aromatic seeds, leaves, and plants, and filled vessels with a mixture of odoriferous gums and spices, and interred these also with the remains of their kindred. One of these vases is shown to tourists at the old military fortress of Alnwick, in Northumberlandshire, and is said to have been taken from an Egyptian catacomb more than 3,000 years ago. It still emits a pleasant odor, and thus affords evidence of the skill with which they prepared their perfumes and the remarkable persistence of their fragrance.

Frankincense and myrrh were the oblations of the ancients in their temples, and curious and strange though it may appear this archaic custom is still observed by the sovereign of England, and is presented annually on the Feast of the Epiphany in the Chapel Royal in London. King Edward VII.'s offering of gold, frankincense, and myrrh was symbolically presented for the first time in January, 1901.

These facts establish the antiquity of perfumes, and serve to illustrate the extensive and manifold uses of aromatic and sweet-scented substances employed in former ages.

Considered from a hygienic point of view perfumes are of much value; they not only mask offensive odors, but operate as true antiseptics and deodorants. A number of persons at one time were seized with unbounded faith in the virtues of perfumes in this respect. Thus, according to tradition, at the time a certain dreadful contagious disease was ravaging a continental city, four men, under the pretense of rendering assistance to the sufferers, plundered the dead, and took advantage of the helpless condition of the sick. These ruffians did not contract the disease. They were ultimately caught and condemned to death. One alone escaped the extreme penalty by confessing the means employed by which he and his companions avoided contagion. This proved to be a certain perfume, the composition of which he disclosed, and it was

known afterward as the "Four Thieves' Bouquet."

It is not intended to present an exhaustive account of the processes employed in the preparation of perfumes, many of which can only be profitably carried out on a large scale. Simple formulæ will be given, such as may be compounded in any pharmacy without the trouble of making numerous extracts, tinctures, and spirits *et hoc genus omne*. Under each formula a few interesting particulars will be offered with reference to any ingredient entering into such formula.

GENERAL DIRECTIONS.

(1) It is absolutely essential for obtaining the best results to see that all vessels are perfectly clean.

(2) Always employ alcohol, 90 per cent., deodorized by means of charcoal.

(3) When grain musk is used as an ingredient in liquid perfumes, first rub down with pumice stone, then digest in a little hot water for two or three hours, finally add to alcohol. The addition of two or three minims of acetic acid will improve the odor and also prevent accumulation of NH_3 . Civet and ambergris should also be thoroughly rubbed down with some coarse powder and transferred directly to alcohol.

(4) Seeds, pods, bark rhizomes, etc., should be cut up in small pieces or powdered.

(5) Perfumes improve by storing. It is a good plan to tie over the mouth of the containing vessel some fairly thick porous material and to allow it to stand for a week or two in a cool place, instead of corking at once.

(6) It is perhaps unnecessary to add that as large a quantity as possible should be decanted, and then filter the residue. This obviously prevents loss by evaporation. Talc or kieselghur (amorphous SiO_2) are perhaps the best substances to add to filter to render liquid perfumes bright and clear. This is more especially necessary in the case of aromatic vinegars.

(7) The word otto implies the essential oil.

ORRIS TINCTURE.

Powdered orris..... 8 ounces
Alcohol (90 per cent.)..... 20 fl. ounces

Macerate seven days, filter, and percolate residue with alcohol sufficient to produce 20 ounces of tincture.

THE KING'S BOUQUET.

Clove otto..... 10 minims
Bergamot otto..... 60 minims
Tonquin grain musk..... 1 grain
Coumarin 10 grains
Concentrated rose water (1 to 40) 1 fl. ounce
Benzoin tincture..... 1½ fl. drachm
Orris rhizome tincture..... 2 fl. ounces
Civet 2 grains
Almond otto..... 5 minims
Alcohol (90 per cent.)..... 8 fl. ounces

Mix and digest for one month.

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Civet is an unctuous, odoriferous substance obtained from the civet cat (*Viverra civetta*, Schreber), which is a kind of weasel. It inhabits Northern Africa, and is domesticated for the sake of the perfume it affords. Another species (*Viverra zibetha*, Schreber), inhabits Northern Asia. The substance is secreted in a small sac, or pouch, placed near the posterior extremity. Civet enters as an ingredient into perfumes as a fixing agent, at the same time giving a distinctive character to the product.

FRANGIPANNI BOUQUET.

Grain musk.....	10 grains
Sandal otto.....	25 minims
Rose otto.....	25 minims
Orange flower otto (neroli otto).....	30 minims
Vetivert otto.....	5 minims
Powdered orris rhizome.....	½ ounce
Vanilla	30 grains
Alcohol (90 per cent.).....	10 fl. ounces

Mix and digest for one month. This is a lasting and favorite perfume.

Vetivert otto is the essential oil of the rhizome of the monocotyledonous plant *An-dropogon muricatus*, Retzius; *Anatherum muricatum*, Beauv. (N. O. *Graminaceæ*), which is very common in Southern India and Bengal. The dried rhizome and rootlets, which are called *kus kus*, or *vittie vayr*, in the Tamool dialect, are used in India for making scented baskets and large fans. The natives also cover a framework, made of bamboo, with the rhizomes, to form, for the doors and windows, screens. These when moistened emit a sweet-scented odor, and during the hot winds are constantly watered; thus the air is kept cool, and an agreeable fragrance imparted to it. This aromatic grass (cuscus grass) is sometimes grown in hothouses, and is easily cultivated. It is propagated by seeds and by division of the fibrous rhizome.

CANANG BOUQUET.

Ylang Ylang otto.....	45 minims
Grain musk.....	3 grains
Rose otto.....	15 minims
Tonka beans.....	3
Cassie otto.....	5 minims
Tincture orris rhizome.....	1 fl. ounce
Civet	1 grain
Almond otto.....	½ minim
Storax tincture.....	3 fl. drachms
Alcohol (90 per cent.).....	9 fl. ounces

Mix, and digest one month. The above is a very delicious perfume.

Cassie otto is derived from the flowers of *Acacia farnesiana*, *Mimosa farnesiana*, L. (N. O. *Leguminosæ*, suborder *Mimoseæ*). It is a very pretty Australian acacia, and out of the many species this one is usually selected for cultivation in greenhouses on account of the delicious odor of its golden-yellow blossoms which somewhat resemble the odor of violets. The wood of this and other species of acacia is valuable by reason of its hardness and durability. It is used for making axletrees and wheels.

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Cassie otto must not be confounded with cassia otto, the essential oil obtained from *Cinnamomum cassia*.

YLANG YLANG.

Ylang Ylang otto.....	10 minims
Neroli otto.....	5 minims
Rose otto.....	5 minims
Bergamot otto.....	3 minims
Grain musk.....	1 grain
Alcohol (90 per cent.).....	10 fl. ounces

Mix, and digest for a fortnight. More delicate than the preceding, but always popular.

Ylang Ylang otto is obtained from the flowers of the canang tree of the Moluccas, the alanguilan of China, *Mona odorata* (N. O. *Anonaceæ*). The word *ylang ylang* in the Tagal dialect signifies the “flower of flowers.” Numerous other species of the various genera belonging to the anonads produce powerful and delicious odoriferous seeds and flowers. These are much esteemed by the Malayanese women for making pomade with which they anoint their bodies. They also wreath chaplets with the flowers for ornamenting their hair, and with them they erect triumphal arches in their marriage ceremonies:

IRIDIA.

Coumarin	10 grains
Concentrated rose water (1 to 40)	2 fl. ounces
Neroli otto.....	5 minims
Vanilla	1 drachm
Almond otto.....	5 minims
Civet	1 grain
Ambergris	3 grains
Orris rhizome (powdered).....	1 drachm
Alcohol (90 per cent.).....	10 fl. ounces

Mix and macerate for one month. This yields a most characteristic and fragrant perfume and should enjoy a wide reputation.

Ambergris (*ambra grisea*, i. e., gray amber) is a morbid secretion formed in the intestines of the sperm whale, *Physeter macrocephalus* (Linn.). It is found floating upon the sea or on the coasts of Brazil and Madagascar; also on the coast of Africa and in the Atlantic Ocean. It was at one time thought to be simply indurated fæces, and some surmised it to be solidified sea foam. Its true source was established by Dr. Swediaur (*vide* “Philosophical Trans.,” vol. lxxiii.). Besides its use in perfumes ambergris is said to have been formerly employed for flavoring sauces and wines; thus Beaumont and Fletcher refer to it in the following lines:

“’Tis well, be sure
The wine be lusty, high, and full of spirit,
And amber’d all.”

Considering its origin, most connoisseurs at the present time would much prefer their wines “unamber’d.”

WHITE ROSE.

Rose otto.....	25 minims
Rose geranium otto.....	20 minims
Patchouli otto.....	5 minims

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Ionone	3 minims
Jasmine otto (synthetic oil of jasmin, Schimmel).....	5 minims
Alcohol (90 per cent.).....	10 fl. ounces

Mix. Popular, delicate, and lasting.

The word attar or otto is derived from the Turkish word *itr*, which signifies perfume or odor. One thousand roses are necessary in order to produce two minims of otto.

IRANIAN ESSENCE.

Bergamot otto.....	20 minims
Lavender otto.....	30 minims
Clove otto.....	20 minims
Sandal otto.....	30 minims
Almond otto.....	15 minims
Rose otto.....	25 minims
Grain musk.....	5 grains
Coumarin	10 grains
Alcohol (90 per cent.).....	10 fl. ounces

Mix, and macerate for a week or more. This essence is rather strong, a small quantity therefore should be made as an experiment, in case it is found to be too powerful.

JAVANESE BOUQUET.

Rose otto.....	15 minims
Pimento otto.....	20 minims
Cassia otto.....	3 minims
Neroli otto.....	3 minims
Clove otto.....	2 minims
Lavender otto.....	60 minims
Sandal otto.....	10 minims
Grain musk.....	2 grains
Alcohol (90 per cent.), deodor- ized	10 fl. ounces
Water	1½ fl. ounces

Mix, and macerate for 14 days.

Cassia otto is obtained from *Cinnamomum cassia*, Blume (N. O. *Lauraceæ*), cinnamon cassia; otherwise known as Chinese cinnamon, also termed China cassialignea.

The word cassia is derived from the Arabic *katsia*, which is from *katsa*, signifying to strip or tear off; this evidently refers to the manner in which the bark is collected.

Large forests of cassia trees surround the principal city of the province of Kwangse, hence the Chinese have named that city *Kwei Lin Too*, which means the City of the Forest of Cassia Trees.

PATCHOULI EXTRACT.

Patchouli otto.....	60 minims
Rose otto.....	10 minims
Limetta otto.....	5 minims
Alcohol (90 per cent.).....	10 fl. ounces

Mix.

Patchouli or pucha-pat otto is obtained from the Indian undershrub *Pogostemon patchouli*, Pellet. (N. O. *Labiatae*.) It presents an appearance similar to garden sage.

The dried leaves are sometimes mixed with tobacco to give an agreeable aroma in smoking, and the fine flavor and bouquet of some of the more expensive cigars is doubtless due to the presence of a small quantity of the otto. It is said that it is added to liquid Chinese ink in order to prevent moldiness; if this be so it does not accomplish its object. One per cent. of formic acid specific gravity 1.2 is more effectual.

In India the otto is freely employed by the natives for perfuming their garments,

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linen, shawls, etc.; to keep off insects and prevent the attack of moths.

A case illustrating the extreme sensitiveness to powerful odors which some persons exhibit is recorded in a French journal. It was that of a young lady who conceived an intense passion for patchouli. She saturated everything around her, from her linen to her furniture; and so immoderate was her use of this perfume that she quickly lost her appetite, suffered from sleeplessness, and was ultimately reduced to a state of extreme nervousness.

Formulae for lavender water and eau de Cologne are as numerous as the leaves of Vallambrosa, and as varied as the fragments of a rainbow; but the following recipe yields a lavender water of fine fragrance, and is one of the best that can possibly be made:

LAVENDER WATER.

English lavender otto.....	2 fl. drachms
Bergamot otto.....	1 fl. drachm
Rhodium otto.....	5 minims
Rose otto.....	10 minims
Ambergris	5 grains
Tonquin grain musk.....	1½ grains
Alcohol (90 per cent.).....	10 fl. ounces

Mix, macerate for one month, and keep for two or three months before using.

LAVENDER WATER (Second Quality).

Lavender otto (Exot.).....	2 fl. drachms
Rose water.....	2 fl. ounces
Alcohol (90 per cent.).....	10 fl. ounces

Mix.

EAU DE COLOGNE (First Quality).

Rosemary otto.....	10 minims
Orange flower otto.....	25 minims
Orange peel otto.....	20 minims
Cedrat otto.....	25 minims
Bergamot otto.....	15 minims
Clove otto.....	3 minims
Alcohol (90 per cent.).....	10 fl. ounces

Mix.

EAU DE COLOGNE (Second Quality).

Rosemary otto.....	15 minims
Lemon otto.....	1 fl. drachm
Lavender otto.....	15 minims
Bergamot otto.....	30 minims
Orange peel otto.....	25 minims
Orange flower water.....	2 fl. ounces
Alcohol (90 per cent.).....	10 fl. ounces

Mix.

CARMELITE BALM WATER.

Melissa otto.....	20 minims
Sweet marjoram otto.....	3 minims
Cinnamon otto.....	10 minims
Angelica otto.....	3 minims
Citron otto.....	30 minims
Clove otto.....	15 minims
Coriander otto.....	5 minims
Nutmeg otto.....	5 minims
Alcohol (90 per cent.).....	10 fl. ounces

Mix.

Angelica otto is obtained principally from the aromatic root of *Angelica archangelica*, L. (N. O. *Umbelliferæ*), which is commonly cultivated for the sake of the volatile oil which it yields.

Gerarde ascribed innumerable virtues to angelica. He praises it as an antidote, as a prophylactic, and as a universal antiseptic, thus quaintly alluding to it:

"The roote of garden angelica is a singular remedie against poison and against the plague, and all infections taken by evill and

Pergamus

corrupt aire; if you do but take a peece of the roote, and hold it in your mouth, or chew the same between your teeth, it doth most certainly drive away the pestilentiall aire." In fact, the plant derives its name from its supposed angelic properties. And we may freely and safely concede similar virtues to the following novel preparation, much in vogue at one time, the recipe for which is given in the "Accomplished Female Instructor" for 1719, namely: "Angel water, an excellent perfume, also a curious wash to beautify the skin. Prepare a glazed earthen pot, and put into it 16 ounces of orange-flower water, a quarter of a pound of benjamin, two ounces of storax, half an ounce of cinnamon, and a quarter of an ounce of cloves grossly bruised, with three drachms of calamus aromaticus; set them over hot embers or a gentle fire to simmer or bubble well up; when about a fifth part is consumed, add a bladder of musk, and a few minutes after take it off and let it cool, pour it off by inclination from the settlings and put it into a thick glass bottle; and of the dross you may make perfumed cakes, or sweet bags, to lay among clothes."

Particularly notice that a bladder of musk was to be used. Was it exceedingly cheap in those days, or were our ancestors unduly extravagant?

Pergamus, in ancient geography, a city of Mysia, in Asia Minor, noted for the magnificence of its buildings, and as the place where parchment was first made, and tapestry, called by the Romans *aulæa*, first worked. After the battle of Issus it became the capital of a kingdom, and flourished for more than 150 years, till conquered by the Romans, 120 B. C. It was destroyed during the Turkish wars, but its extensive ruins are still visible, and have been explored with great success and these testify to the importance of the place in ancient times.

Pergolese, Giovanni Battista, an Italian musician; born in Jesi, Italy, Jan. 3, 1710; studied music at Naples, and struck out an original style for himself. His first great work was the oratorio of "San Guglielmo," composed in 1731, in which year appeared his bright and tuneful operetta of "The Maid Mistress." This is his masterpiece; it was revived in London in 1873. In 1734 he was appointed *maestro di cappella* of the Church of Loretto. In consequence of delicate health he removed to Pozzuoli, where he composed the cantata of "Orfeo," and his second masterpiece, the pathetic "Stabat Mater," but died immediately afterward, March 16, 1736.

Pergunnahs, or **Parganas**, a district of India, forming the metropolitan district of the lieutenant-governorship of Bengal; area,

Pericardium

2,128 square miles. It forms a great alluvial plain, part of the delta of the Ganges, intersected by innumerable river channels, creeks, and canals.

Peri, according to the mythical lore of the East, a being begotten by fallen spirits, which spends its life in all imaginable delights, is immortal, but is forever excluded from the joys of paradise. It takes an intermediate place between angels and demons, and is either male or female. So far from there being only female peris, as is supposed by some, and these the wives of the devs, the peris live, on the contrary, in constant warfare with these devs. Otherwise, they are of the most innocuous character to mankind, and, just like the fairies with whom our own popular mythology has made us familiar, the females are of surpassing beauty. They belong to the great family of genii, or Jinn.

Perianth, the envelope surrounding the reproductive organs in a flower when the calyx and corolla are not easily discriminated. Example, the petaloid or colored portion of a lily.

Pericardium, a conical membranous sac containing the heart and the commencement of the great vessels, to the extent of about two inches from their origin. It is placed with its apex upward behind the sternum in the interval between the pleuræ—the serous sacs in which the lungs are enclosed; while its base it attached to the diaphragm. It is a fibro-serous membrane, consisting of an external fibrous and an internal serous layer. The outer layer is a strong, dense, fibrous membrane; the serous layer invests the heart, and is then reflected on the inner surface of the fibrous layer. Like all serous membranes, it is a closed sac; its inner surface is smooth and glistening, and secretes a thin fluid which serves to facilitate the natural movements of the heart. It is inflammation of this serous sac which constitutes the disease that is known as pericarditis.

Diseases of the Pericardium.—Pericarditis is a disease of frequent occurrence; the result of a very large number of post-mortem examinations being to show that about one in 23 of all who die at an adult age exhibits traces of recent or old attacks of this disorder. The first change which takes place in an inflamed pericardium is a dulling of its glistening surface, with some congestion, which is speedily followed by effusion into the sac. The effusion is sometimes almost entirely fibrinous, in which case it coagulates, and gives rise to adhesions between the heart and the pericardium; or it may consist almost entirely of serum, which remains liquid; or it may be, and most frequently is, a mixture of the two. In a few cases it rapidly becomes pur-

Pericardium

ulent. In the cases that prove fatal when fibrinous fluid has been effused, but has not coagulated to such an extent as to cause complete adhesion of the heart to the pericardium, the partially coagulated fibrin or lymph is seen to be of a yellowish-white color, and to occur in a rugged, shaggy, or cellular form. Laennec compared the surface on which the lymph is deposited to that which would be produced by suddenly separating two flat pieces of wood between which a thin layer of butter had been compressed. When the patient dies at a more advanced stage of the disease—viz., soon after the whole of the membrane has become adherent—incipient blood vessels, in the form of red points and branching lines, are seen, indicating that organization is commencing in the deposit, which if death had not ensued would have been finally converted into cellular or areolar tissue, and might have occasioned the complete obliteration of the pericardial cavity.

The recognition of the disease depends almost entirely on the signs revealed by auscultation and percussion. The earliest is generally the “friction sound,” or “to and fro murmur,” caused by rubbing together of the roughened surfaces, and heard to accompany the heart’s action; but if fluid is effused it may speedily disappear. In this case percussion of the chest shows that the dull area occupied by the heart is larger than normal, while the impulse of the organ on the chest wall cannot be felt. The symptoms, besides those common to all inflammations, are extremely variable; in some cases where pericarditis comes on in the course of other serious disease the patient makes no complaint, and the complication is only discovered during the routine examination of the chest. But there may be intense pain and tenderness on pressure in the region of the heart, great irregularity or feebleness of the heart’s action, distressing breathlessness, delirium, and other symptoms.

Pericarditis is a disease which occasionally runs a very rapid course, and terminates fatally in 48 hours or less. In ordinary cases, however, which terminate in apparent recovery, the disease generally begins to yield in a week or 10 days, and, excepting that adhesion may remain, the cure appears to be complete in three weeks or less. If the adhesions which have formed are dense and fibrous, they may impede the heart’s action and lead to serious symptoms at some subsequent period.

Pericarditis rarely occurs as an independent disease. It may result from extension of an inflammation in a neighboring organ, pleura, ribs, etc. It is no uncommon result of a contaminated state of the blood, such as occurs in the exanthematous diseases, especially scarlatina, and in Bright’s

Pericles

disease of the kidney; but, beyond all comparison, it is of most frequent occurrence in association with acute RHEUMATISM (*q. v.*), of which it forms one of the most serious complications. It is often associated with inflammation of the muscular substance of the heart, and, especially in rheumatism, of the lining membrane as well.

The treatment of pericarditis at present in favor is much less active than when bleeding, mercurialization, etc., were considered necessary. Complete rest in bed, light diet, with opium or other sedatives as required; general medication suited to the disease with which the pericarditis is associated; local application of poultices or cotton wool, sometimes of leeches or blisters, are the chief measures employed. In cases where there is extensive fluid effusion it may be necessary to aspirate, or, if the fluid be purulent, even to make a free incision.

The pericardium may also be distended with fluid without inflammation (hydropericardium) in the course of general dropsy; and occasionally is the seat of tumors, syphilitic or tubercular processes, etc.

Pericarp, the seed vessel of a plant; everything which in a ripe fruit is on the outside of the real integuments, except the aril. It may be membranous, fleshy, or horny, and is divided into the pericarp, the sarcocarp, and the endocarp.

Pericles, the great Athenian statesman; born in Athens about 495 B. C., of a noble, influential and wealthy family. He received a careful education from the most eminent teachers. He applied himself to the study of philosophy under the guidance of Anaxagoras, who had a most powerful influence on him, and remained one of his most intimate friends. To his other acquirements he added that of extraordinary eloquence, and thus prepared, he began to take part in public affairs about 469 B. C., and the popular party soon recognized him as their chief. He effected a great change in the constitution of the Areopagus, the stronghold of the aristocratic party, by which its authority was much limited, and Cimon, the head of that party, was immediately ostracized. Pericles was great as a general, and he displayed extraordinary valor at the battle of Tanagra; he commanded the expedition against Sicyon and Acarnania; recovered Delphi from the Spartans, and quelled the revolt of Eubœa. In 444 B. C. he became sole ruler of Athens, and the aim of his policy was to extend and strengthen her empire, and to make the people worthy of their position. Under his administration the navy was increased, commerce extended, general prosperity

advanced, and Athens adorned with noble buildings. Phidias was the friend of Pericles, and under his direction the Parthenon,



PERICLES.

the Propylæa, the Odeon, and the other temples and monuments, the admiration of all time, were erected. In 444 B. C. Pericles established a democratic constitution in Samos, and a counter revolution taking place, he besieged the town, and after nine months reduced it, a success which procured him extraordinary honors on his return. His personal enemies, hopeless of success in any direct attack on him, aimed their blows at his friends; Phidias was imprisoned, Anaxagoras banished, and Aspasia was only saved by the most earnest intercession of her husband. Pericles directed Athens during the first two years of the Peloponnesian War, in the second year of which the plague broke out at Athens, and the popular discontent vented itself in the prosecution of the great ruler. He was fined, but soon regained his influence. The plague carried off many of his friends and relatives, and, last of all, his favorite son, Paralus. This loss broke his heart, and after a lingering sickness he died 429 B. C. He left a son by Aspasia, who took his father's name, and was legitimated by the people.

Peridote, a name given by jewelers to the green transparent varieties of olivine. It is usually some shade of olive-green or leek-green. Peridote is found in Brazil, Ceylon, Egypt, and Pegu. It is a very soft gem stone, difficult to polish, and, when polished, liable to lose its luster and to suffer by wear.

Périer, Casimir, a French politician; born in Grenoble, Oct. 21, 1777. A Parisian banker, he condemned in 1817 the financial policy of the ministry and thereby won a seat in the Chamber of Deputies. In 1828 he held the portfolio of finance under Martignac, but resigned it in August of the next year. Having taken an active part in the July revolution (1830), he was rewarded with a seat in the cabinet, but without a portfolio. When, however, Laffitte became president of the council (Nov. 2), Périer

undertook the presidency of the Chamber of Deputies. On March 13, 1831, he succeeded Laffitte as minister, and sternly repressed all attempts at revolution. He died May 16, 1832.

Perigee, the point in the moon's orbit at which she is nearest the earth.

Périgord, an old province of France. It formed part of the military government of Guienne and Gascony, and is now represented by Dordogne and part of Lot-et-Garonne.

Périgueux, a town of France, formerly capital of Périgord, now in the department of Dordogne; on the right bank of the Isle, a tributary of the Dordogne; 95 miles N. E. of Bordeaux. It consists of the ancient city, which is gloomy in aspect and has narrow streets, with numerous houses and other remains of mediæval and Renaissance architecture, and the Puy St. Front, which till 1269 was a separate and a rival town. The cathedral of St. Front is a Byzantine edifice, said to be a copy of St. Mark's at Venice, built in 984-1047, but spoilt by "restoration" in 1865. The museum is especially rich in Roman and other antiquities. Statues of Montagne, Fénelon, and the soldiers Daumesnil and Bugeaud adorn public places in the town. Iron is mined and worked, and woollens are manufactured. The celebrated *pâtes de Périgueux*, made of partridges and truffles, are largely exported. Périgueux, a town of the highest antiquity, is the Gallic Vesunna mentioned by Cæsar. The Romans built another town on the opposite side of the river at the junction of five Roman roads. Close to the modern town are the remains of a vast amphitheater, aqueducts, baths, and temples. The tower of Vesunna is the most remarkable fragment of Roman architecture. It is 89 feet high, 200 feet in circumference, and has walls 6 feet thick, but has neither doors nor windows. Its purpose is not known. The district of Périgord is noted for its caves and archæological finds. Pop. 31,313.

Perihelion, or **Perihelium**, the part of a planet's or comet's orbit where it is nearest the sun, as opposed to aphelion. One of these is said to be in perihelion when it is at the extremity of the major axis of the elliptical orbit nearest the focus occupied by the sun.

Perim, a barren island, and coaling and telegraph station, belonging to Great Britain, in the Strait of Bab-el-Mandeb, at the S. entrance to the Red Sea, 97 miles W. of Aden. It is about $3\frac{1}{2}$ miles long by $2\frac{1}{2}$ wide, and crescent shaped, the two horns embracing a deep and spacious harbor. The island was held by the British in 1799-1800, and was again occupied in 1857. In 1883 it was made a coaling station, and soon began to be a rival to Aden. The island is under the jurisdiction of the governor of Bombay presidency.

Perimeter

Perimeter, in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces.

Perinæum, or **Perineum**, the soft external floor of the pelvis from the rectum to the vagina in the female, and to the root of the penis in the male. It plays an important part in primiparous labor, being frequently ruptured, unless great care is taken to prevent it; its elasticity, however, renders this of less importance in subsequent parturitions, if it has escaped injury in the first instance.

Period, in geology, one of the largest divisions of geological time. In this sense there are at least three periods, the Primary, the Secondary, and the Tertiary periods, to which a fourth or Quaternary one is sometimes added; also their subdivisions; as, the Glacial period. In mathematics, a number of figures considered together; one of two or more sets of figures or terms marked off by points or commas placed regularly after a certain number, as in numeration, in circulating decimals, or in the extraction of roots. In music, two or more phrases ending with a perfect cadence. In pathology, an interval more or less fixed in point of time at which the paroxysms of a fever, etc., recur. In printing, the full stop (.) which marks the end of a sentence in punctuating, or indicates an abbreviation, as Mr., Jan., B. C., etc. In rhetoric, a complete sentence from one full stop to another; a sentence so constructed as to have all its parts mutually dependent.

Period, a term used in chronology in the same sense as cycle, to denote an interval of time after which the astronomical phenomena to which it refers recur in the same order. It is also employed to signify a cycle of cycles. The Chaldæans invented the Chaldaic period, or period of eclipses, from observing that, after a certain number of revolutions of the moon round the earth, her eclipses recurred in the same order and of the same magnitude. This period consists of 323 lunations, or 6,798.28 days, and corresponds almost exactly to a complete revolution of the moon's node. The Egyptians made use of the dog-star, Siriacal, or Sothric period, as it is variously called, to compare their civil year of 365 days with the true or Julian year of $365\frac{1}{4}$ days. The period consequently consisted of 1,460 Julian years, corresponding to 1,461 Egyptian years, after the lapse on which the dates in both reckonings coincided. By comparing the solar and lunar years Meton, an Athenian, invented (432 B. C.) a lunar period of 6,940 days, called from him the Metonic cycle, also the lunar cycle. The Calippic period was invented by Calippus, and consisted of four Metonic cycles less by

Periodicals

one day, or 27,759 days. But as this period still gave a difference of six hours between the solar and lunar reckonings, it was improved by Hipparchus, who invented the Hipparchic period of four Calippic periods, less by one day, or 111,035 days, or about 304 Julian years, which is an exceedingly close approximation, being only six and one-half minutes too long, when measured by the tropical year; and too short, but by an almost inappreciable quantity, when measured by the Synodic month. The period of the heliacal or solar cycle, after which the same day of the month falls upon the same day of the week, consists of 28 Julian years. If the year had regularly consisted of 365 days, *i. e.*, one day more than an exact number of weeks, it is evident that at the end of seven years the days of the month and week would again correspond; but the introduction of an intercalary day into every fourth year causes this coincidence to recur at irregular periods of six, eleven, six and five years successively. However, by choosing a period such as will preserve the leap years in the same relative position to the other years and at the same time consist of an exact number of weeks (both of which objects are effected by using the number 28, which is the least common multiple of four and seven), we insure the regular recurrence of the coincidence between the days of the week and of the month. The solar cycle is supposed to have been invented about the time of the Council of Nice (A. D. 325), but it is arranged so that the first year of the first cycle corresponds to 9 B. C. In calculating the position of any year in solar cycle care must be taken to allow for the omission of the intercalary day at the beginning of each century, and its insertion in the last year of every fourth century. The Julian period is a cycle of cycles, and consists of 7,980 ($= 28 \times 19 \times 15$) years, after the lapse of which the solar cycle, lunar cycle, and the indiction commence together. The period of its commencement has been arranged so that it will expire at the same time as the other three periods, from which it has been derived. The year 4713 B. C. is taken as the first year of the first period.

Periodicals, publications which appear at regular intervals, and whose principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. Periodicals exclusively devoted to criticism are generally called reviews, and those whose contents are of a miscellaneous and entertaining kind magazines; but there is not great strictness in the use of the terms. The first periodical was pub-

lished in France, being a scientific magazine, the "Scientists' Journal," issued in 1665, and still existing in name at least. The most famous French literary periodical is the "Review of Two Continents," begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems, etc., are admitted, and the names of the contributors have to be attached to their articles. The earliest English periodical seems to have been the "Weekly Memorials for the Ingenious," the first number of which is dated January, 1681-1682, and which lasted but a year. It was followed by several other periodicals, which for the most part had but a brief existence. In the 18th century a number of monthly reviews appeared, including the "Monthly Review" (1749-1844); the "Critical Review" (1756-1817); the "British Critic" (1793-1843); the "Anti-Jacobin Review and Magazine" (1798-1821). At length in 1802 a new era in criticism was introduced by the "Edinburgh Review," the organ of the Whigs, which came out every three months, and soon had a formidable rival in the "Quarterly Review" (1809), the organ of the Tories. In 1824 the "Westminster Review" was started by Bentham as the organ of utilitarianism and radicalism, and with it was afterward incorporated the "Foreign Quarterly Review" (1827-1846); and in 1836 the "Dublin Review" was established as the organ of the Roman Catholic party. All these quarterlies still exist as well as the "London Quarterly Review" (1853), the "Church Quarterly Review" (1875), and the "Scottish Review" (1882). To meet the demand for critical literature at shorter intervals than three months, there was published in 1865 the "Fortnightly Review," which for about a year was true to its name, but has since appeared monthly. It was followed by the "Contemporary Review" (1866) and the "Nineteenth Century" (1877). Among the more recent periodicals of this class (in which literary criticism occupies but a small space) are the "National Review" (1883), a Conservative organ; "Universal Review" (1888), an illustrated review published in the middle of each month; the "New Review," a monthly begun in 1889; and the "Review of Reviews," a monthly giving extracts from all the current periodicals, begun in 1890. The "Athenæum" (1828), "Academy" (1869), "Saturday Review," "Spectator," "Scots Observer," and "Speaker" (all weekly publications) combine the character of the review with more or less of that of the newspaper.

Passing over the "Tatler" (1709-1710), "Spectator" (1711-1712, revived 1714), etc., which may be considered to be *sui gen-*

eris, the first English magazine properly speaking may be said to be the "Gentleman's Journal, or Monthly Miscellany," commenced in 1692. It was followed in 1731 by the "Gentleman's Magazine," published by Cave. The success of Cave's venture brought out a host of imitators. The "London Magazine" (1732-1784), the "Scots Magazine" (1739-1817), the "European Magazine" (1782-1826), and the "Monthly Magazine" (1796-1829), were among the chief of this class which were originated in the 18th century. In 1817 appeared the first number of "Blackwood's Edinburgh Magazine," which soon distanced all its predecessors, and took rank as the best serial of the kind in Great Britain. Closely approaching it in point of merit stood the "New Monthly Magazine," "Fraser's Magazine," "Tait's Edinburgh Magazine," and the "Dublin University Magazine." A new era in this kind of literature was inaugurated by the shilling monthlies, some of them with excellent illustrations, the first being "Macmillan's Magazine" (1859), "Cornhill Magazine" (1860), "Temple Bar" (1860); closely followed by a number of others. Another step in the direction of cheapness was shortly afterward made by the publication of monthly magazines at sixpence, including the "Argosy," "Good Words," the "Sunday Magazine," etc., followed at a long interval by "Longman's Magazine," the "Cornhill Magazine" (reduced in price), the "English Illustrated Magazine," "Murray's Magazine," and others, some illustrated, some not. Weekly periodicals to suit the taste of all classes, at prices from 2 to 6 cents, have come into fashion since 1832, when the initiative was taken by the "Penny Magazine" and "Chambers's Journal." Some of these, as "Chambers's," and "Leisure Hour" (established in 1852), are now issued in monthly parts. The most popular American reviews and magazines of our times are the "North American Review" (1815), now monthly, "Harper's Monthly Magazine," the "Atlantic Monthly," "Lippincott's Magazine," "Scribner's Magazine," "Century Magazine," "The Cosmopolitan," "The Metropolitan," "Munsey's Magazine," "McClure's Magazine," "Frank Leslie's Popular Monthly," "American Review of Reviews," "The New Illustrated Magazine," "The New England Magazine," "The Chautauquan," "The Arena," "Overland Monthly," "Popular Science Monthly," "Catholic World," "Forum," and "The World's Work."

Periodicity, the disposition of certain things or phenomena to recur at stated periods. It denotes the regular or nearly regular recurrence of certain phenomena of animal life, such as sleep and hunger. The first indication of a diseased state is gener-

Periophthalmus

ally a disturbance of the natural or acquired periodicity of the various functions of life.

Periophthalmus, a genus of *Gobiidæ*, from the coasts of the Indo-Pacific, remarkable for their prominent retractile eyes, which enable them to see in the air as well as in the water, and for their strong ventral and pectoral fins, by the aid of which they can hop freely over the ground, when they leave the water, as is their habit at ebb tide, to hunt small crustaceans. The species are few in number; but *P. koelreuteri* is one of the commonest fishes of the Indian Ocean.

Periosteum, a dense lining membrane covering the whole surface of bone, except the articulations, which have a thin cartilaginous layer. As long as a single portion of periosteum remains alive bone is capable of being reproduced.

Periostitis, inflammation of the periosteum, a painful ailment frequently brought on by sudden exposure to cold after being heated.

Peripatetic, the name given to the followers of the Aristotelian philosophy. Aristotle partly adopted the results of Plato, and made them available for the world, partly he dissented from the Platonic doctrines and carried on war against them. Both teachers admitted that science could only be formed from Universals, but Aristotle took the view afterward called Nominalist, and contended that such Universals were nothing more than inductions from particular facts. He thus made experience the basis of all science. In the Middle Ages, Albertus Magnus (1193-1280) did much to spread the Peripatetic philosophy, as well as the ethical and physical writings of Aristotle, and his pupil, St. Thomas Aquinas (1227-1274), the greatest of the Scholastics, was much influenced by them. The study of the works of Aristotle was greatly revived in the 19th century, and those of St. Thomas Aquinas were specially recommended to clerical students by Pope Leo XIII.

Peripatus, the sole genus of the group *Peripatidea* or the order *Onychophora*. They are vermiform animals, indistinctly segmented, with soft integuments. On each side of the body there are a number of short legs, terminated by a rudimentary jointed part, and a pair of hooked claws. The head bears a pair of simple annulated antennæ, and a pair of simple eyes. They are viviparous, nocturnal in habit, and are found in decaying wood. The genus was made known by the Rev. L. Guilding, who discovered *P. iuliformis* in the island of St. Vincent. Several species are known, from the West Indies, the Cape of Good Hope, South America, and New Zealand.

Peritoneum

Periphery. See CIRCUMFERENCE.

Periploca, the typical genus of the tribe Periploceæ. The very acrid milk of *P. græca* is used in the East to poison wolves. The fragrant flowers of *P. aphylla* are eaten by the Hindus. The fiber, mixed with that of *Leptadenia spartium*, makes good cordage.

Periplus, a voyage round a certain sea or sea coast; circumnavigation.

Peripteral, surrounded by a row of columns; applied especially to a temple in which the cella is surrounded by columns, those on the flank being distant one intercolumniation from the wall.

Perissodactyla, in Owen's classification, a section of Ungulata. The hind feet are odd toed in all, and the fore feet in all but the *Tapiridæ* and the *Brontotheridæ*. Dorsolumbar vertebræ never less than 23. Femur with a third trochanter. Horns, if present, not paired, except in the extinct *Diceratherium*. Usually there is but one horn; if two are present, they are in the median line of the head, one behind the other, not supported by bony horn cores. Stomach simple; cæcum large and capacious. The section is now usually divided into seven families: *Coryphodontidæ*, *Brontotheridæ*, *Palæotheridæ*, *Macrauchenidæ*, *Rhinocerotidæ*, *Tapiridæ*, and *Equidæ*, of which the first four are extinct.

Peristyle, an open court within a house, having a colonnade around it, by which the principal apartments were reached; the exact reverse of the peripteros, though the same in character, the one being inside, the other outside a building.

Peritoneum, one of the most difficult parts in the human anatomy for a teacher to explain intelligibly to his pupils, and the last that the student is able thoroughly to understand. Yet, as it is a very important structure, and a knowledge of its function and action explains many doubtful circumstances, we will endeavor to give our readers an idea of what the peritoneum is like, and how it performs its duties. From birth till death, the bowels are constantly moving and gliding over each other, in a worm like perpetual motion, called peristaltic motion. It will be self evident to every comprehension, that this day and night friction of such delicate textures as those composing the integuments would, in the 70 years of man's life, wear out, or at least in time most seriously injure them. To prevent this friction, nature has provided the peritoneum, an immense shut-bag, like a man's closed nightcap. The inside—that portion out of sight—presents, when cut open, a smooth, glairy surface, studded with innumerable vessels, always pouring out a thin, smooth fluid, like the liquid white of an egg, allowing the two sides, when rub-

bed together, to glide over each other, as if oiled, without check or the slightest friction. The outside of this peritoneal night cap is rough and granulated, not unlike the uneven texture of the actual article. The peculiarity of the inner and outer sides of this immense bag lies in this, that the surface of the first is close, smooth, moist, and shiny, and, however firmly pressed, can never grow together, or keep long in contact; while that of the other is rough, dry, and adheres firmly to all with which it comes in contact. This external side, then, adheres to the muscles of the abdomen, and to every portion of the intestines, but in such a manner that between every convolution, or twist of the bowels, a fold of peritoneum accompanies it, so that between the bowel above or below there is always the two glairy sides rubbing against each other, and allowing the intestines to glide about without let or hindrance, the bowels being always on the outside of the bag, but always gliding over the two inner sides. The peritoneum is a serous membrane, and, in the same way as it covers the bowels, lines and invests every organ in the abdominal and pelvic cavities.

Peritonitis, inflammation of the peritoneum; it is exceedingly painful and dangerous, from its extent and connection with important organs. Peritonitis may exist either as an acute or chronic disease. In the former there is usually great pain and tenderness of the abdomen, accompanied with fever, and a frequent, small, and hard pulse. Sometimes, at first, the pain is confined to one spot, but it generally soon extends over the whole of the abdomen. It is very severe, and much increased by any motion, even coughing, sneezing, or drawing a long breath. Even the weight of the bed-clothes is sometimes unbearable. It is acute and cutting, and sometimes occurs in paroxysms; and the patient usually lies on his back with his knees drawn up. The bowels are usually constipated, but sometimes the reverse; and commonly there are present nausea, vomiting, and hiccough. Its causes are various, as by cold, mechanical injuries of the peritoneum, the development of tumors, etc. Women in childbed are peculiarly liable to it. After the disease has continued for a certain time, it is attended with tension and swelling of the belly; and if not checked, it usually terminates in from 5 to 10 days. The appropriate treatment, when the state of the patient admits of it, is copious general bleedings, followed by the application of leeches to the abdomen, together with warm fomentations; frequently the latter is all that the state of the patient admits of. As internal remedies, most reliance is usually placed on mercury and opium. After a time peritonitis sometimes assumes a chronic

form. Here the symptoms are less marked. The pain is slight, or only discoverable on pressure, and the fever low; but the skin is hot and dry, the tongue foul, and appetite impaired. The treatment is local bleedings, with blisters and other counter irritants applied over the abdomen. A nourishing, but unstimulating diet, and attention to the state of the bowels, are likewise necessary; and some recommend iodine, either taken internally, or applied as ointment to the part.

Periwinkle (*Littorina*), a genus of marine Gasteropods, represented by several species on British coasts. The commonest, *L. littorea*, is abundant between tide marks on the rocks, and is often collected and used for food. It is boiled in its shell, extracted as eaten, and is very palatable. Periwinkles crawl about under water, but usually remain passive when left uncovered by the tide. Without water they can survive for many hours, and they are also able to endure a considerable freshening of the salt water. They feed on sea weeds, and are often useful in keeping beds of young oysters from being smothered. Periwinkles drawn up from 70 to 80 fathoms were first in 1889 used as bait for cod fishing on the banks of Newfoundland. The edible species is oviparous, but in *L. rudis*, which is usually common nearer high water mark, the young are hatched and have a hard shell before they leave the mother. These shells are apt to make this periwinkle gritty, and therefore it is not used as food. Among the structural characters of the periwinkle the substantial shell of few whorls, the closely fitting, horny operculum, the nearly circular shell aperture without any siphon notch are at once evident. Species of *Littorina* occur on almost all coasts, and there are about 50 in all. It should be carefully noticed that the periwinkle is often called the wilk, wulk, or whelk in Scotland, but it is not nearly related to the true whelks.

Periwinkle (*Vinca*), a genus of herbaceous or suffruticose plants of the natural order *Apocynaceæ* or dogbane family. The greater and lesser periwinkle (*V. major* and *V. minor*) are hardy plants, which blossom in early spring, and are pretty common in woods, hedges, and thickets in many parts of Europe and in the S. of England. Their flowers are of a fine blue color, but when cultivated in gardens they may be made to yield purple and variegated flowers, both single and double.

Perjury, the taking of a wilful false oath or affirmation, by a witness lawfully required to depose the truth in a matter of some consequence to the point in question. A false oath, therefore, taken before no court, or before a court incompetent to try the issue in question, does not constitute

the offense of perjury at common law. But many statutes in the United States, passed by the general government or the several States on the matter, provide that a false oath or declaration made on some specified occasions, or for some particular purposes, shall be considered to be perjury, and punishable accordingly. Perjury is a misdemeanor at common law, and by several statutes punishable by fine and imprisonment, and by penal servitude for a term not exceeding seven years.

Perkins, Charles Callahan, an American writer and lecturer on art; born in Boston, in March, 1823; was a prominent art critic and lecturer, and president of the Boston Art Club (1869-1879). His published works include: "Italian Sculptors" (1868); "Raphael and Michel Angelo" (1878); "Sepulchral Monuments in Italy" (1883). He was also critical editor of the "Cyclopædia of Paintings and Painters" (1892). He died in Windsor, Vt., Aug. 25, 1886.

Perkins, Frederic Beecher, an American miscellaneous writer; born in Hartford, Conn., Sept. 27, 1828. He received his education at Yale; studied law, and was admitted to the bar in 1851. He was librarian of the San Francisco Library from 1880 to 1887. Among his works are: "Scrope; or, The Lost Library" (1874), a novel; "Devil Puzzlers, and Other Studies" (1877); "Life of Dickens" (1877); "The Best Reading" (1877). He died in Morristown, N. J., Jan. 29, 1899.

Perkins, George Hamilton, an American naval officer; born in Hopkinton, N. H., Oct. 20, 1836; was graduated at the United States Naval Academy in 1856; took part in numerous naval engagements in the Civil War, chiefly on the Mississippi; and was in the battle of Mobile Bay. He was promoted commodore in 1896. He died in Boston, Mass., Oct. 28, 1899.

Perkins, Jacob, an American inventor; born in Newburyport, Mass., in 1766. He early became distinguished for his ingenuity, and when 21 years of age, he was employed by the commonwealth of this State to make new dies for copper coinage. He next became noted for his improvements in the engraving of bank notes, and, in 1818, went to England with the expectation of obtaining a contract for supplying the Bank of England with plates. Failing in this, he, however, procured a contract for serving the Bank of Ireland, and carried on business in London for a number of years. Becoming interested in the subject of steam artillery, Perkins constructed a gun in which steam generated at an enormous pressure, operated as the propelling power instead of gunpowder. His invention was satisfactorily tested in presence of the Duke of

Wellington and a number of artillery officers, but was finally condemned as being inapplicable to modern warfare. He died in London, in 1849.

Perkins, James Breck, an American lawyer and historical writer of Rochester, N. Y.; born in St. Croix Falls, Wis., Nov. 4, 1847. His chief works are: "France under Mazarin" (1886); "France under the Regency" (1892); "France under Louis XV.," etc. He died in 1910.

Perkins, Justin, an American missionary; born in West Springfield, Mass., March 12, 1805; was educated at Amherst and Andover. In 1833 he went to Persia as a missionary, and was active in establishing schools in that country. His works include: "Residence of Eight Years in Persia" (1843); "Missionary Life in Persia" (1861). He died in Chicopee, Mass., Dec. 31, 1869.

Perkins, William Oscar, an American composer; born in Stockbridge, Vt., May 23, 1831; was educated at Kimball Union Academy, and Harvard University, and in 1879 took the degree of Mus. D., at Hamilton College, N. Y. He subsequently studied music in Boston and Europe. Mr. Perkins was well known as a conductor, organizing the Mendelssohn Vocal Quartet, the first male quartet for concert singing in the United States; conducting at Boston Music Hall, and at various musical festivals; and being a member of the governing board of the Handel and Haydn Society. He published over 60 anthems, cantatas and set pieces, and was the author of "The War in South Africa, or Briton and Boer" (1900). He died in Boston, Mass., Jan. 13, 1902.

Perlite, a variety of obsidian with an enamel-like luster and a gray color. Structure, usually granular, fine to coarse-grained, occasionally spherulitic. Sub-translucent to opaque. Under the microscope it exhibits numerous more or less elliptical or spheroidal cracks, which are due to the contraction of the rock while it is becoming cool.

Perm, a town of Russia, on the Kama, by which it is 685 miles N. E. of Kazan. It is the chief seat of the extensive transit trade between European Russia and Siberia, and has a cathedral, tanneries, distilleries, flour mills, and oil works, and a government arsenal and cannon foundry. Pop. (1908) 45,205.

Permanent Way, name in England for the finished road bed and track, including bridges, viaducts, crossings, and switches. The term is used in contradistinction to a temporary way, such as is made in construction, for removing the soil of cuttings and making fillings.

Permanent White

Permanent White, baric sulphate; it is used as a water color pigment, and in the manufacture of fine earthenware.

Permanganate, a compound of permanganic anhydride, Mn_2O_7 , and a base. Potassic permanganate is used as a disinfectant, and as a chemical reagent.

Permian Period, the name given to the closing era of the Carboniferous age, which was a time of decline for Palæozoic life, and of transition toward a new phase of geological history. In the United States the Permian rocks are confined to the interior continental basin, and occurs in the portion of it W. of the Mississippi, especially in Kansas. The rocks are limestones, sandstones, red, greenish, and gray marls or shales, gypsum beds and conglomerates, among which the limestones in some regions predominate. The Permian period was so called by Murchison, because he found them largely developed in that portion of Russia which composed the ancient kingdom of Permian, of which the actual government of Perm forms a part.

Permutation, the act of exchanging one thing for another; mutual change; interchange; intermutation. Also in mathematics, change or combination of any number of quantities. The different arrangements which can be made of any number of given quantities, when a certain number, or the whole of them, are taken together; thus the permutations of a, b , and c , taken two together, are ab, ac, ba, bc, ca , and cb . The number of permutations of n things taken two together is $n(n-1)$; of n things taken three together, $n(n-1)(n-2)$, and so on.

Pernambuco, a town in Brazil, capital of the State of the same name, on the E. coast. It consists of three distinct parts: Recife, occupying a small peninsula; San Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. Recife is the principal seat of business. In it are the custom house, the exchange, a marine arsenal, etc. San Antonio has broad streets and many fine houses, and contains the episcopal palace, the theater, the military arsenals, etc. Boa Vista is the fashionable residential quarter. The harbor is formed by the reef, which incloses a belt of water about a mile in width. The trade is extensive. The principal exports are sugar and cotton; and the chief imports Manchester goods and hardware. Pernambuco was founded by the Portuguese in the 16th century. From 1630 to 1654 it was in the hands of the Dutch, under whom it prospered greatly. It is now the third largest city in Brazil, and the second in point of commercial importance. Pop. 150,000. The State has an area of 49,573 square miles. Pop. 1,178,150. The principal cultivated crops are the sugar

Perpetual Motion

cane and cotton. It is chiefly the coast districts that are cultivated. The interior is either pasture land or covered with forests yielding valuable timber, including Brazil wood, often called Pernambuco wood.

Peroxide, a term applied in mineral chemistry to certain dioxides in which the second atom of oxygen is held in a state of weak combination, as in the case of barium peroxide, BaO_2 . By the action of strong sulphuric acid, barium sulphate is formed and oxygen set free. In organic chemistry, it applies to certain peroxides of organic radicals produced by the action of barium peroxide on the anhydride of the radical. Acetic anhydride is by this means converted into peroxide of acetyl, $\left. \begin{matrix} C_2H_3O \\ C_2H_3O \end{matrix} \right\} O_2$.

Perpendicular, in geometry, a line falling directly on another line, so as to make equal angles on each side. A straight line is said to be perpendicular to a curve, when it cuts the curve in a point where another straight line to which it is perpendicular makes a tangent with the curve. In this case the perpendicular is usually called a normal to the curve.

Perpendicular Style, the third period of Pointed Architecture. It originated at the end of the 11th century, and continued till the close of the 16th, when it was succeeded by the Revived, or Debased Classic, known as the Elizabethan. It is also known as the Florid, from the multiplicity, profusion, and minuteness of ornamental detail, and its more general name, Perpendicular, is derived from the mullions of the windows and the divisions of ornamental panel work running in straight or perpendicular lines, which was not the case in any earlier style. The pointed arches are constructed from almost every radius. The most common doorway is the depressed four-centered arch (almost peculiar to this style) within a square head, having generally a hood molding over, the spandrels being filled with quatrefoils, paneling, roses, foliage, small shields, or other sculptured ornaments. Fan shaped roofs, ornamented with dependent pendants resembling stalactites, are also peculiar to the Perpendicular style. Richly decorated roof trusses, which are left clearly visible, are also of frequent occurrence. In these roofs the spaces between the highly ornamented and molded beam are filled with rich tracery, while the intersections and junctions of the woodwork are enriched with dependent carving and representations of foliage and figures. Westminster Hall is an instance of this description of roof. The roofs, when they are plain, are sometimes overlaid with boarding, and divided by ribs and panels.

Perpetual Motion, a motion which, once generated by mechanical means, should have

the power of perpetuating itself. A machine which, according to the hopes of its inventors, after it has been once set in motion, will keep in motion without drawing on any external source of energy. Such a machine would entirely controvert the established principle of the conservation of energy, and since the establishment of that principle the search for a perpetual motion has been judged visionary. As early as 1775 the Académie des Sciences of Paris placed the problem in the same category with the duplication of the cube and the quadrature of the circle, and refused to receive schemes claiming to have overcome the difficulty—in reality, to have performed the impossible. The overbalancing wheel was a favorite contrivance with the seekers after a perpetual motion. It appears as early as the 13th century. Perpetual motions have been founded on the hydrostatic paradox, on capillary attraction, on electricity and magnetism, but in every case the result has been a failure.

Perpetuity, uninterrupted or continued duration or succession; endless duration; continuance to eternity; something of which there will be no end; that which continues indefinitely. The number of years in which the simple interest of any sum invested in an annuity or annuities becomes equivalent to the principal; also, the amount which will purchase an annuity payable forever. In law, quality or class of an estate by which it becomes inalienable, either perpetually or for an indefinitely long period of time; also, the estate so perpetuated.

Perpignan, a town of France, and a fortress of the first rank; in the department of Pyrénées-Orientales, on the river Têt, 7 miles from the Mediterranean, 40 S. of Narbonne, and 17 from the Spanish frontier. It commands the passes of the Eastern Pyrenees, and is defended on the S. by a citadel, which encloses the old castle of the Counts of Roussillon, and by a detached fort. The streets are narrow and the houses of semi-Moorish construction, and show evidences of Spanish influence. The cathedral (begun in 1324), the Moorish-Gothic cloth hall or bourse (1396), the town house (1692), the building of the former university (1349–French Revolution), the court house, and a college are the principal public buildings and institutions. Good red wine is made, sheep and silkworms are bred, vegetables and fruit grown, brandy distilled, cloth woven, and corks cut; and there is a good trade in wine, spirits, wool, cork bark, oil, cloth, and silk. As capital of the former county of Roussillon Perpignan was in the hands of the kings of Aragon from 1172 to its capture by France in 1475; it was restored to Spain in 1493; but Richelieu retook it in 1642, and France has possessed it ever since. Pop. (1906) 38,898.

Perranzabuloe, a Cornish coast parish, 10 miles N. by W. of Truro. The rude little stone oratory (25 by 12½ feet) of St. Piran, who was sent to Cornwall by St. Patrick in the 5th century, had been buried in the sands for 1,000 years, when it was discovered in 1835; it is probably the earliest ecclesiastical structure in England. Perran Round is a circular enclosure, with seven rows of seats that could seat 2,000 spectators, in which miracle plays were performed of old.

Perrault, Charles, a French writer; born in 1628; superintendent of royal buildings under Colbert. His highly mediocre poem, "The Age of Louis the Great" (1687), gave rise to the famous controversy on the comparative merits of the ancients and moderns, and his "Tales of Mother Goose" have procured for him the title of "inventor of the French fairy tales." He died in 1703. His brother CLAUDE, born 1633, died 1688, was a physician, naturalist, and architect, from whose designs the celebrated façade of the Louvre and the observatory at Paris, were built. The brothers Perrault assisted Colbert in founding the French Academy of Art, of which Charles was the first librarian.

Perrens, François Tommy, a French historian; born in Bordeaux, France, Sept. 20, 1822. Among his works are: "Jerome Savonarola" (1854); "Church and State under Henri IV." (1872); "Democracy in France in the Middle Ages" (1873); "General History of Paris"; "History of Florence from the Beginning to the Domination of the Medicis" (1877–1884); continued down to the fall of the republic (1893).

Perret, Paul, a French novelist; born in Paimbœuf (Loire Inférieure), Feb. 12, 1830. He wrote: "Life's Seven Crosses"; "Eve's Fair Daughters"; "Neither Maid nor Widow" (1879); "What Love Costs" (1881); "Half Marriages" (1881); "King Margot" (1887); "The Last Dreamers" (1890).

Perrin, Benadotte, an American educator; born in Goshen, Conn., Sept. 15, 1847; was graduated at Yale College in 1869; studied at Leipsic and Berlin Universities in 1876–1879; and was Professor of Greek in Western Reserve University in 1881–1893, and was then appointed to the chair of Greek at Yale University. He edited many text-books on classical subjects.

Perrot, Georges, a French archæologist; born in Villeneuve-Saint-Georges, France, Nov. 12, 1832. He became Professor of Archæology in the Faculty of Letters (1877), and director of the Upper Normal School (1883). During his archæological investigations in Asia Minor, he made the first complete copy of the celebrated inscription

on the monument to Augustus at Ancyra. He enjoys a world wide reputation as co-author, with the architect C. Chipiez, of a "History of Art in Antiquity" (1881-1889), in five volumes, treating of art in Egypt, Chaldæa, Asia Minor etc. They have been translated into English.

Perry, a fermented liquor made from the juice of pears. It is prepared in the same way as cider.

Perry, Bliss, an American educator and editor; born in Williamstown, Mass., Nov. 25, 1860. He was Professor of Oratory and Æsthetic Criticism at Princeton University resigning to become editor of the "Atlantic Monthly." He has published: "The Broughton House" (1890); "Salem Kittredge, and Other Stories" (1894); "The Plated City" (1895); etc.

Perry, Nora, an American author; born in Dudley, Mass., in 1832. For many years she was a correspondent of the Chicago "Tribune" and the Providence "Journal." Early in her career she gained a reputation as a poet, but was more widely known as a writer of stories for girls. Her works include: "After the Ball, and Other Poems" (1875); "For a Woman" (1885), a novel; "New Songs and Ballads" (1886); "A Flock of Girls" (1887); "A Rosebud Garden of Girls" (1892); "Hope Benham" (1894). She died in 1896.

Perry, Oliver Hazard, an American naval officer; born in South Kingston, R. I., Aug. 23, 1785; famous for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with 54 guns and 492 officers and men, fought six vessels, with 63 guns and 502 officers and men, lost four-fifths of the crew of his flagship, and finally won a complete victory, which he announced in the brief dispatch: "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." Perry died of yellow fever in Trinidad, Aug 23, 1819, and was buried at Newport, R. I., where there is a bronze statue (1885).

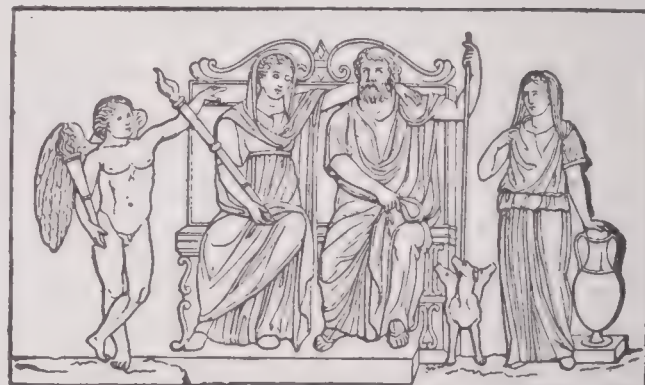
Perry, Thomas Sergeant, an American author; born in Newport, R. I., in 1845; was graduated at Harvard in 1866; tutor in German there, 1868-1872; and instructor in English, 1877-1881. He spent many years abroad, and was a frequent contributor to magazines. One of his best efforts is "The Evolution of the Snob" (1887). His other works are: "English Literature in the 18th Century" (1883); "From Opitz to Lessing" (1884); "History of Greek Literature" (1890).

Perry, William Stevens, an American clergyman and historian; born in Providence, R. I., Jan. 22, 1832. He became Protestant Episcopal bishop of Iowa in 1876, and was one of the editorial revisers of Johnson's "Universal Cyclopædia," in 1892-1895. Among the best known of his

numerous books are: "Documentary History of the Protestant Episcopal Church" (1863); "History of the American Episcopal Church" (1885); "Life Lessons from the Book of Proverbs" (1885). He died in Dubuque, Ia., May 13, 1898.

Persecution, the act or practice of persecuting; specifically, the act of afflicting with suffering or loss of life or property for adherence to particular opinions, religious creed, political views, nationality, etc., either as a penalty or in order to compel the sufferers to renounce the principles in which they believe.

The word first became current in Christian circles in connection with 10 persecutions of Christians under the Roman emperors. The first was the persecution under Nero, A. D. 64; the second, under Domitian, A. D. 95; the third, under Trajan, A. D. 106; the fourth, under Marcus Aure-



PERSEPHONE AND PLUTO: A RELIEF IN THE VATICAN.

lius, A. D. 166; the fifth, under Septimius Severus, A. D. 198; the sixth, under Maximin I., A. D. 235; the seventh, under Decius, A. D. 250; the eighth, under Valerian, A. D. 258; the ninth, under Aurelian, A. D. 275; and the 10th, under Diocletian, A. D. 303. The arrangement is not perfect. If only persecutions general through the empire are counted, the number is fewer than 10; if local ones are taken into account, they are more numerous. When Christianity became dominant in portions of the Roman empire, it used the civil power for the overthrow of heathenism. The mediæval church persecuted all whom it considered heretics, and the Reformation in England everywhere had to struggle against persecution. When it became powerful enough, it also became intolerant to those who differed from it, passing and carrying out penal laws against Roman Catholics, dissenters, and unbelievers.

Persephone, in Greek mythology, the daughter of Zeus and Demeter (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Demeter she was permitted to spend the spring and summer of each year

Persepolis

in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephone were Attica



PERSEPOLIS: A RELIEF.

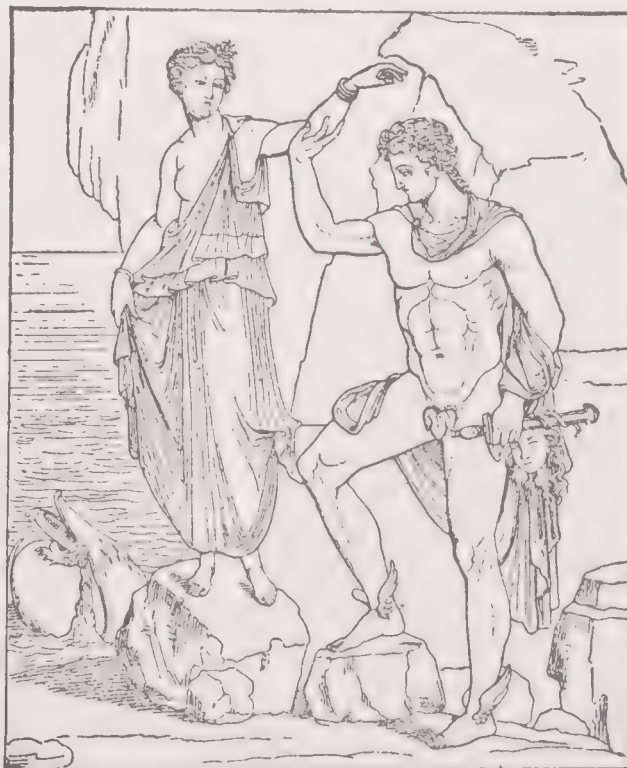
and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return. In works of art Persephone is sometimes represented as sitting by the side of her husband, and sometimes alone.

Persepolis, the Greek translation of the lost name of the capital of ancient Persia, was situated on the Araxes river, to the E. of the Medus river, in the plain of Merdusht, about 35 miles to the N. E. of Shiraz, on the road to Ispahan. A number of most remarkable ruins is all that now remains of Persepolis. Darius Hystaspes, Xerxes, Artaxerxes, and other Archæmenides, each in his turn contributed toward its aggrandizement. Alexander the Great, in his march of conquest, is said to have destroyed Persepolis completely; but this must probably only be understood to apply to some of the chief places.

Perseus

Perseus, an ancient Greek hero, and a son of Danaë and Zeus. He was set adrift in the sea on his birth, in a chest along with his mother. But the chest reached the Island of Seriphos, and Perseus was brought up by the king of the island, who exacted a promise from him to fetch the head of the Gorgon Medusa. This he accomplished under the guidance of Hermes and Athena, and with the assistance of the nymphs. He also delivered Andromeda from a sea monster, an exploit which is frequently figured in ancient art. He was king of Tiryns and founder of Mycenæ. After his death Perseus was worshiped as a hero, and placed among the stars.

Perseus, or **Persus**, the last king of Macedonia, son of Philip V. From jealousy of his younger brother Demetrius, he accused him falsely to his father, and induced him to put him to death. He came to the throne on the death of Philip, 178 B. C. The great event of his reign was the war with the Romans, which, long expected, began in 171 and ended in 178, by the total defeat of Perseus at Pydna, by L. Æmilius Paulus. Perseus escaped with his children and treasures to Samothrace, but soon gave himself up, and after being led in triumph to Rome, was cast into prison. He was, however, allowed to spend his last years at Alba. Macedonia became a Roman province. In astronomy, a N. constellation, be-



PERSEUS AND ANDROMEDA.

tween Andromeda on the W., and Auriga on the E. Its mean declination is 46° N. It

is on the meridian, Dec. 24. It contains, including the Head of Medusa, which forms part of it, 59 stars, two of which are of the 2d magnitude.

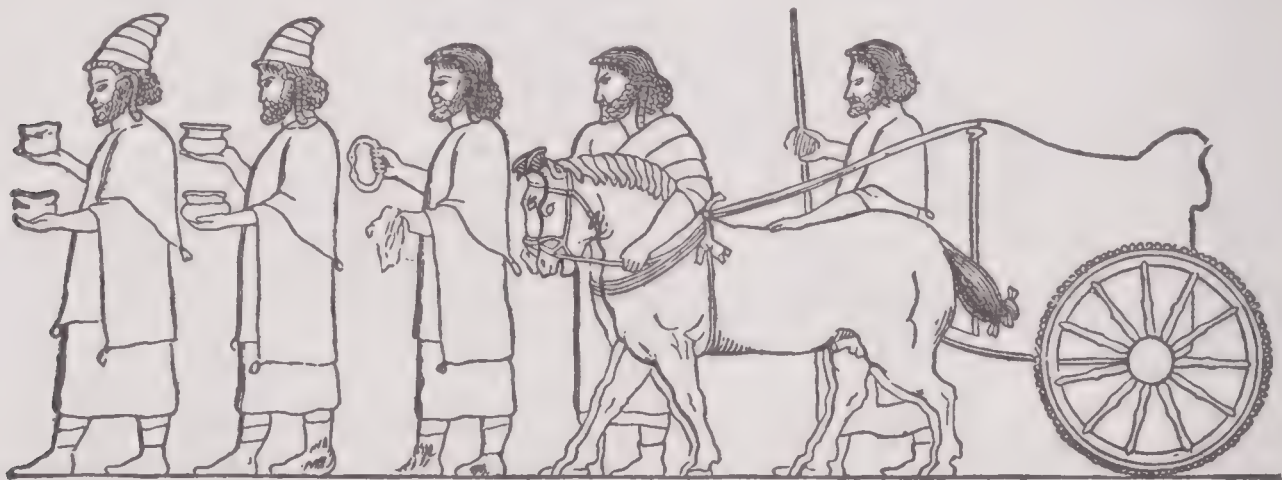
Perseverance, the Calvinistic doctrine that those who are elected to eternal life, justified, adopted, and sanctified, will never permanently lapse from grace or be finally lost. Called more fully the perseverance of the saints. It is founded on Matt. xxiv: 24, John x: 27-29, Rom. vii: 29-39; Phil. i: 6, etc.

Persia (Persian Iran), an extensive country of Asia, bounded on the N. by the Caspian Sea, the Transcaspian and Transcaucasian provinces of Russia; S. by Persian Gulf and Indian Ocean; E. by Russian territory, Afghanistan and Baluchistan, and W. by Asiatic Turkey. Its length obliquely from N. W. to S. E. is 1,500 miles; area, about 628,000 square miles.

Topography.—On the N. W. and S., several lofty mountain ranges—some of con-

Persia. It has been computed that barely a third of the entire kingdom is fit for cultivation; and, though husbandry is well attended to, and the advantages of copious irrigation are thoroughly understood, so little encouragement is given by the state to agriculture, that but a small part of the capable soil is tilled. The most important rivers are the Aras, Murghab or Bende-mir, Atrek, Serid-Rud, and the Tigris. The lakes of most note are, Uremiyah, or Shalu, Bakhtegan, and Mahdigla; from these, and from minor streams and bodies of water, an elaborate system of irrigation is effected all over the cultivated grounds, while vast subterranean aqueducts convey the water to more remote situations.

Productions and Climate.—The vegetable productions of Persia embrace all kinds of legumes and cereals, except rye, oats, and rice; barley and wheat are the most abundant crops. Drugs of various kinds are obtained, such a senna, rhubarb, gums, opium, etc.; as also oils, cotton, indigo, sugar, mad-



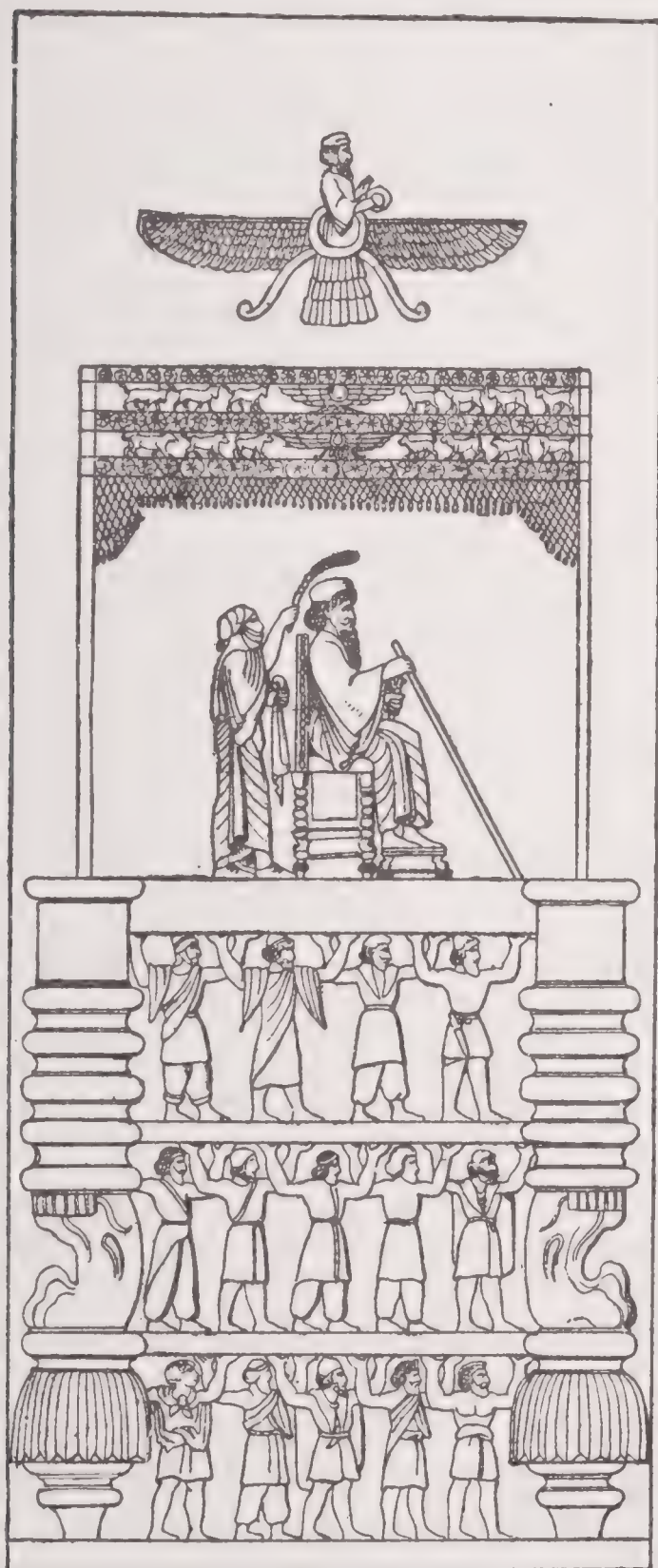
PERSEPOLIS: A RELIEF.

siderable length, others short and abrupt—intersect the land in many directions, the center of the country consisting in general of a vast plain or table-land. The lowest or most level portions of the country lie along the bed of the Tigris and the shore of the Persian Gulf. Persia possesses many extensive plains and barren deserts, and the interior is generally bare, bleak, and arid. The mountains appear to be a confused heap of hills piled upon hills, in grand but indefinite order; while each individual hill appears a mass of gray rock reared block on block, or starting in huge boulder abruptly from the face of the plains or plateaux. The plains, again, are vast naked steppes, destitute of trees or foliage; and it is only on the margin of water courses, or the banks of rivers, that either villages or vegetation of any abundance are found. The provinces, however, along the S. and W. margin of the Caspian are an exception to the rest of the country, and present some of the most beautiful and fruitful pictures of richness and abundance to be found in

der, dates, pistachio nuts, and tobacco; while in flowers, and the perfumes extracted from them, especially the attar of roses, no country in the world can compare with Persia for beauty, fragrance, and abundance. Silk is an important item; and plantations of mulberry trees of great extent are very numerous. Vast flocks of sheep and goats are pastured over the country, the property and wealth of the wandering tribes of the interior, the *Eelauts*, a kind of Bedouins, devoting themselves to pastoral habits. The animals for which Persia is famous, are camels, horses, mules, oxen, asses, and buffalos. The mineral wealth consists of silver, copper, lead, iron, antimony salt, precious stones—especially turquoise—bitumen, and springs of naphtha. There are also large, undeveloped fields of coal and petroleum. One of the features of Persia is the abundance of salt in the soil, and the large number of its salt lakes; about 30 pure salinas have no outlet; and one, the largest, Uremiyah, is 280 miles in circumference, and, though supplied by 14 rivers,

Persia

its water is so dense, bitter, and loaded with salt, that no fish can live in it. Another, called the Bakhtegan, is 42 miles long. Situated near the former are some remarkable ponds, whose waters are petrifying. The climate of Persia embraces the rigors experienced on the mountains of the snowy N., and the heats felt on the sandy



PERSIAN KING ON THRONE.

plains of Africa. Cyrus the younger told Xenophon that his father's empire was so vast that in the N. the people perished of cold, and in the S. were suffocated with heat.

Manufactures.—The manufactures of Persia are numerous and important, and embrace all kinds of silk fabrics, satins, taffetas, textures of silk and cotton, silk

Persia

and goat's hair, or silk and camel's hair; brocades, camel's hair shawls, gold tissues, gold velvet, camlets, carpets, cottons, leather, firearms, sword blades, saddlery, and jewelry. Its principal trade is carried on with Russia; the internal traffic is very great. The total exports for 1904-05 were \$20,111,733; imports, \$28,380,690.

Government.—The form of government up to the year 1906 was highly despotic and similar to that of Turkey, the laws being based on the precepts of the Koran. An edict of the sovereign, once passed, could never be repealed; his word was irrevocable, and the lives and property of his subjects were absolutely in his hands. In 1905, however, the Persian people demanded representative institutions, the movement growing out of the discontent at the incompetence and misgovernment of the grand vizier, Ain-ed-Dowleh, a kinsman of the Shah. A crisis was reached in July, 1906, when the leaders of the protesting party left Teheran for Kum, and their followers, numbering about 16,000, fled to the British legation. Thereupon Ain-ed-Dowleh was dismissed and a successor appointed. On Aug. 5, the Shah signed a decree authorizing the convocation of a national assembly which should consist of, and be elected by, the princes of the reigning dynasty, clergy, nobles, landowners, merchants, and tradesmen. This new national body met Oct. 12 and chose a president; its constitution was drawn up Jan. 1, 1907, and signed by the Shah. There is also to be a senate, consisting of sixty members, one-half representing the Shah, the other half the National Assembly.

Customs.—They are greatly addicted to the use of tobacco, which they smoke incessantly. The system of bribery and corruption is so universal, that it has eaten into the very manners of the people; and no one can ask the slightest favor without first prefacing his request with a present, which must be in value according to the service sought to be rendered. In their domestic occupations, they do not recline like the Turks, but sit erect on the *humud*, a mass of folded felt. The women are dressed in a black turban, from which depends a rich Cashmere shawl, reaching almost to the termination of the robe, which is only a little shorter than the men's, and fastened in front by large gold buttons. Each Persian is restricted to four legal wives, though the number of his concubines is only regulated by the amount of his coffers; in this respect they resemble the Turks.

Language and History.—The Persian language is the most celebrated of all the Oriental tongues, for strength, copiousness, beauty, and melody, and is written from the

right to the left. Persia is divided into 12 provinces, namely: Azerbaijan, Kurdistan, Luristan, and Khusistan, on the W.; Faristan, Laristan, and Kerman, on the shores of the Persian Gulf, or S.; Irak-Izeme and Khorassen, in the interior; and Ghilan, Mazanderan and Astrabad, in the N., or along the Caspian shores. The modern capital is Teheran. The earliest account we possess of Persia is from the Bible, from which we learn that, in the time of Abraham, 1921, B. C., that portion of modern Persia known as Elam, or Suisiana, Southern Persia, was a powerful monarchy. But the Persians, as a nation, first rose into notice on the ruins of the great empires founded on the Euphrates. Babylon was taken by Cyrus, and his empire extended



wider than any before established in the world. It comprised, on one side, the West of India; on the other, Asia Minor, Syria, and Egypt; and was only bounded by the prodigies of valor with which the Greeks defended their small territory. After a feeble struggle, it succumbed to the brave and disciplined armies of Alexander. It was then split into fragments by the decease of its founder; but Greeks and Greek sovereigns continued, during several centuries, to reign over Asia. About two centuries before Christ, Arsaces founded the monarchy of the Parthians; and in the 3d century arose the dynasty of the Sassanidæ, who restored the name, with the religion and laws, of ancient Persia. They were overthrown by the Mohammedan invaders, who suffered in their turn from the successive invasions by the descendants of Genghis, Timur, and by the Turks, who entirely changed the aspect of Western Asia. At length, in 1501, a native dynasty again arose, under Ismail, who placed himself on the throne. His posterity having sunk into voluptuousness, Persia, in the beginning of

the 18th century, was overrun by the Afghans, who carried fire and sword through its remotest extremities, and reduced its proudest capitals to ashes. The atrocities of the Afghans were avenged, and the independence of Persia vindicated by Nadir Shah, but though the victories of this daring chief threw a luster on his country, after his death it was almost torn to pieces by civil war, till the fortune of arms gave a decided superiority to Kereim, or Kur-reem Khan. His death gave rise to another disputed succession, with civil wars as furious as before. At length, Aga Mahomed, a eunuch, raised himself, by crimes and daring, to the sovereignty, and not only swayed it during his lifetime, but founded a dynasty represented at the present time by Mohammed Ali Mirza (born June 21, 1872), who succeeded his father, MUZAFFAR-ED-DIN (*q. v.*), on Jan. 9, 1907.

Persian Gulf, an arm of the Indian Ocean which penetrates between Arabia and Persia to the extent of 650 miles in a general N. W. direction. Its breadth varies from 55 miles at the mouth to 250 miles, and the area is estimated at 77,450 square miles, not including the islands, which are scattered over the W. half, or lie close inshore along the E. side. The chief of these islands are Ormuz, at the mouth; Kishm, 810 square miles in extent; and the Bahrein Islands. The Great Pearl Bank stretches along the W. side from Ras Hassan to nearly half way up the gulf. The coast is mostly formed of calcareous rocks. On the Arabian side it is low and sandy, occasionally broken by mountains and cliffs; while on the Persian side it is higher and abrupt, with deep water close inshore, owing to the mountain ranges of Fars and Laristan running close to the water's edge. The islands are partly of limestone and partly of ironstone, and are generally destitute of springs, barren, desolate, and presenting numerous traces of volcanic eruptions. With the exception of the Shat-el-Arab, the Persian Gulf receives only insignificant streams. Its E. side presents abundance of good anchorage, either in the numerous bays or in the lee of islands. The greater portion of its S. shores now belongs to the Imam of Muscat, while the whole of the N. shore belongs to Persia. The order of the periodic currents in this gulf is precisely the reverse of that of the Red Sea currents, as they ascend from May to October, and descend from October to May. The greatest depth does not exceed 50 fathoms; and Dr. John Murray calculates its total cubic contents at 2,200 cubic miles of water. Oriental geographers give to this gulf the name of the "Green Sea," from a remarkable strip of water, of a green color, lying along the Arabian coast.

Persian Powder

The submarine telegraph cables belonging to the government of India, and forming part of the system of the Indo-European Telegraph, pass through the whole length of the Persian Gulf, from Fao at the mouth of the Shat-el-Arab, where they connect with the Turkish lines, to Bushire, where they connect with the Persian, and thence to Jask, Gwadur, and Kurrachee, where they connect with the general telegraph system of India.

Persian Powder, a preparation made from the flowers of *Pyrethrum corneum* or *roseum*, and reduced to the form of powder. It is used as an insecticide.

Persian Wheel, a contrivance for raising water to some height above the level of a stream. In the rim of a wheel turned by the stream a number of strong pins are fixed, from which buckets are suspended. As the wheel turns, the buckets on one side go down into the stream, where they are filled, and return up full on the other side till they reach the top. Here an obstacle is placed in such a position that the buckets successively strike against it and are over-set, and the water emptied into a trough. As the water can never be raised by this means higher than the diameter of the wheel, it is obvious that this rude machine is capable of only a very limited application.

Persigny, Jean Gilbert Victor Fialin, Duc de, a French statesman; born in Saint-Germain-l'Espinasse, Loire, Jan. 11, 1808, entered the cavalry school at Saumur in 1826, and the 4th Hussars in 1828; but he was expelled from the army for insubordination in 1831. Then, having been introduced to Louis Napoleon, he secured his favor, and commenced a career of Bonapartist propagandism throughout France and Germany. He had the chief hand in the affair of Strassburg (1836) and in the descent on Boulogne (1840), but was captured there, and condemned to 20 years' imprisonment. On the breaking out of the revolution in 1848 Persigny was one of the men who secured the election of Napoleon as president of the republic; he also took a prominent part in the coup d'état of December, 1851. In January, 1852, he succeeded De Morny as minister of the interior; from 1855 to 1860 (except for one year) he was ambassador at the English court; then he resumed the office of minister of the interior until June, 1863. In September of the same year he was created duke. Thereafter he sat in the senate till the fall of the empire, when he escaped to England. He died in Nice, Jan. 12, 1872.

Persimmon, or Persimon, *Diospyros virginiana*, a tree 60 feet or more in height, with ovate, oblong, taper-pointed, shining leaves, pale yellow flowers, and an orange-colored succulent fruit an inch or more in

Personality

diameter; very astringent when green, but eatable when bletted. It grows plentifully in the Southern and South Atlantic States. The fruit is brewed into beer, and yields an ardent spirit on distillation.

Persistence, or Persistency, in physics, the continuance of an effect, when the cause which originated it ceases to act; as, the persistence of the motion of an object after the moving force is withdrawn; the persistence of light on the retina after the luminous body is withdrawn.

Persius, Flaccus Aulus, a Roman satirical poet; born in Volterra, Etruria, in A. D. 34. His six "Satires," which present a picture of prevailing corruption, are distinguished for vigor, conciseness, and austerity of tone. They have been frequently translated into English. He died in 62, aged 28.

Person, a human being represented in dialogue, fiction, or on the stage. Character or characters of office; as, the person of a prince or magistrate. A human being considered with respect to the living body or corporeal existence. An individual human being, consisting of body and soul; a man, woman, or child, considered as opposed to things, or distinct from them; a self conscious being; a moral agent; an individual of the human race. Also, among Trinitarians, one of the three subjects constituting the godhead, or the trinity of the Father, Son, and Holy Ghost. A human being indefinitely; one; an individual. The subject, or anything affirmed by a verb; also, that modification of the verb which is used in connection with the subject.

Personal Actions, those brought for the specific goods and chattels, or for damages or other redress for breach of contract or for injuries of any description; the specific recovery of lands, tenements, and hereditaments only excepted.

Personal Bond, a bond which acknowledges the receipt of a sum of money and binds the granter, his heirs, executors, and successors, to repay the same at a specified term, with a penalty in case of failure, and interest on the sum while the same remains unpaid.

Personal Equation, the correction of personal differences between particular individuals as to exactness in observations with astronomical instruments.

Personal Exception, in the law of Scotland, the equivalent of the English estoppel; a ground of objection which applies to an individual and prevents him from doing something which, but for his conduct or situation, he might do.

Personality, individuality; that which constitutes an individual a distinct person, or that which constitutes individuality.

An application of remarks to the conduct and character of individuals by way of disparagement; as, to avoid personalities.

Personalty, or Personal Property, movables; chattels; things belonging to the person, as money, jewels, furniture, etc., as distinguished from real estate in lands and houses. In the United States and England the distinction between real and personal property is very nearly the same as the distinction between heritable and movable property in the law of Scotland.

Personification, the act of personifying, an embodiment, an impersonation. In rhetoric, a figure of speech, or a species of metaphor which consists in representing inanimate objects or abstract notions as endued with life and action, or possessing the attributes of living beings; *prosopopœia*; as, "Confusion heard his voice."

Perspective, the science of representing appearances, and as such is opposed to geometry, which is the science of representing facts. It is founded upon such rules as can be deduced from the facts which are discovered by looking at objects through a sheet of glass or other transparent medium placed upright between the object and the observer. It is found when objects are so looked at that their apparent form is very different from their real one, both as regards shape and distinctness. The portion of the subject which deals with the changes in form is absolutely scientific; it is called linear perspective. The changes in distinctness are effected by distance and atmosphere, and differ constantly with different conditions of light and atmosphere. It is the purely artistic side of the science which is called *aërial perspective*, and success in its application depends on the individual ability of the artist. The chief point with which linear perspective has to deal is the apparent diminution in size of objects as they recede from the spectator, a fact which any one can test by observing a long straight stretch of railway. The cross sleepers and the telegraph poles diminish in apparent size to the point of invisibility when they are far off on the horizon. It is the rules which govern such changes as these which are dealt with by linear perspective; while the fact that the same telegraph poles, black and brown and yellow when seen close, gradually put on a blue hazy color as they become more distant is one of the facts dealt with by *aërial perspective*. A practical knowledge of the science is absolutely a necessity for a successful artist.

A kind of painting designed expressly to deceive the sight by representing the continuation of an alley, a building, a landscape, or the like. Oblique (or angular) perspective, where the plane of the picture

is supposed to be at an angle to the side of the principal object in the picture, as, for instance, a building. Parallel perspective, where the plane of the picture is parallel to the side of the principal object in the picture. Perspective plane, the surface on which the objects are delineated, or the picture drawn. It is supposed to be placed vertically between the eye of the spectator and the object. Also termed the plane of projection, or the plane of the picture.

Perspectograph, an instrument for the mechanical drawing of objects in perspective. The object is placed in front of the eye, which is applied to a small hole. A movable hinged bar is so adjusted as to bring a point between the eye and a certain part of the object. The bar is then folded down and the mark transferred to the paper. A series of such marks affords data for the drawing of the object.

Perspiration, watery matter "breathed out," or made to expire from the system by means of the pores in the skin. It is more copious than the matter sent forth from the lungs by respiration, averaging 11 grains per minute against 7 from the lungs. The quantity varies greatly, and is affected by the amount of heat or dryness in the atmosphere, by the fluid drunk, by the exercise taken, by the relative activity of the kidneys, by medicine, etc. The relative proportions of sensible and insensible perspiration also vary; and sometimes, when, seeing drops on our skin, we believe that we are perspiring copiously, the increase is chiefly in the sensible kind, not in the total amount. Less than 2 per cent. of solid matter is contained in the watery vapor. The chief ingredients are: Sodium chloride, formic, acetic, butyric, and perhaps propionic, caproic, and caprylic acids; neutral fats, cholesterine, nitrogen, etc. Besides keeping the skin in a healthy, moist condition, and acting as a refrigerator, perspiration takes its share in carrying off superfluous or noxious matter from the system. If stopped, morbid consequences are sure, sooner or later, to ensue.

The horse perspires freely all over the body; the pig does so on the snout; the cat chiefly on the soles of the feet; the dog from the same part, but not to the same extent. Rabbits, and the rodentia generally, appear not to sweat at all. It is used also of the transudation of water through pores of plants. According to Hales, the perspiration of plants is proportionately 17 times as copious as that of animals.

Perth, a city and royal and parliamentary burgh of Scotland, capital of the county of the same name, on the right bank of the Tay, and at the common junction of railways from Dundee, Aberdeen, Glasgow, Edinburgh, and Inverness. The river and

Perth

fine surrounding scenery give this city a most attractive appearance. The North and South Inches, two fine public parks, extend along the river bank, and a fine bridge of nine arches leads to the suburb of Bridge-end. Perth has several good streets, crossing each other nearly at right angles, and many handsome public and private buildings. St. John's Church, a Gothic building partly ancient; the Episcopal cathedral, the county buildings, the new municipal buildings, the penitentiary or convict prison, and the railway station, the largest in Scotland, deserve special mention. Perth is celebrated for its bleachfields and dye works. It manufactures cotton goods, gingham, winceys, plaids, table linen, carriages, castings, etc. The river is navigable to the city for small vessels. Perth is generally supposed to be of Roman origin. Its earliest known charter is dated 1106; but it was first erected into a royal burgh in 1210 by William the Lion. Till the death of James I., in 1437, it was the capital of Scotland, and both then and subsequently it became the scene of some of the most remarkable events in Scotch history. The city of Perth returns one member to the House of Commons. Pop. (1901) 32,873.

Perth, the capital of Western Australia, occupies a picturesque site on the N. bank of the Swan river, 12 miles from Fremantle, its port, at the mouth of the river. Perth is the headquarters of banking for the colony, and the center of the principal railway lines, including the Great Southern railway to Albany. The more important buildings are the town hall, the Protestant (1888) and Roman Catholic cathedrals, mechanics' institute and museum, and the governor's residence. Pop. (1906) 52,300.

Perth, The Five Articles of, a measure passed in a General Assembly of the Church of Scotland, convened at Perth by the order of James VI. in 1618. The first of these articles required communicants to receive the elements kneeling; the second permitted the dispensation of the communion privately in case of sickness; the third allowed private baptism on sufficient cause being shown; the fourth required that children of eight years should be confirmed by the bishop; and the fifth enjoined the observance of Christmas, Good Friday, Easter, Ascension, and Whitsunday. These articles were ratified by the Estates in 1621, but in the Assembly held at Glasgow in 1638 the assembly of Perth was declared to be unlawful and null, and the Five Articles were formally condemned.

Perth Amboy, a city and port of entry in Middlesex co., N. J.; at the head of Raritan Bay and the mouth of Raritan river, and on the Staten Island Rapid Transit, the Central of New Jersey, the Penn-

Peru

sylvania, and the Lehigh Valley railroads; 27 miles S. W. of New York; opposite the S. end of Staten Island. Here are a high school, Old Ministers' Home (Pres.), public library, waterworks, electric lights, several banks, and a number of daily and weekly newspapers. It has manufactories of cork, stoneware pottery, firebrick, terracotta, hollow brick, and emery, and an assessed property valuation of over \$4,000,000. Perth Amboy was settled about 1680 by a colony from Scotland. It received a city charter in 1718. William Franklin, the last British governor of New Jersey, was captured here in 1776. Pop. (1890) 9,512; (1900) 17,699; (1910) 32,121.

Pertinax, Publius Helvius, a Roman emperor; born in A. D. 126, the son of a freedman. He distinguished himself in the army, and attracted the attention of Marcus Aurelius who elevated him to the consulate in 179. During the reign of Commodus, Pertinax was employed in Britain and Africa, and finally made prefect of Rome. After the murder of Commodus he was proclaimed emperor in 193, but in three months was murdered by the praetorian guards.

Perturbation, any disturbance or irregularity in the movement of a planet in its orbit. Every heavenly body, by the law of gravitation, possesses an attractive power over every other one. When, therefore, the orbits of any two approach, each causes a perturbation in the movement of the other. Magnetic perturbation, irregular declination of the magnetic needle. This may be produced by earthquakes, by volcanic eruptions, by the aurora borealis, etc.

Peru, a city in La Salle co., Ill.; at the head of navigation on the Illinois river, and on the Chicago, Rock Island, and Pacific railroad; 100 miles S. W. of Chicago. Here are St. Mary's Hospital, high school, public library, street railroad and electric light plants, waterworks, National and State banks, and several weekly newspapers. It has grain elevators, breweries, rolling mills, and manufactories of clocks, zinc, plows, sulphuric acid, brick, tile, sash doors, blinds, and wheels. The assessed property valuation exceeds \$500,000. Pop. (1900) 6,863; (1910) 7,984.

Peru, a city and county-seat of Miami co., Ind.; on the Wabash river, and on the Lake Erie and Western and the Wabash railroads; 75 miles N. of Indianapolis. Here are a public library, Wabash Railroad Hospital, waterworks, electric lights, National and State banks, and several daily and weekly newspapers. It has the Lake Erie and Western Railroad shops, and manufactories of flax, carriages, baskets,

Peru

foundry products, glass, furniture, flour, woolen goods, carbon, etc., and an assessed property valuation of \$3,000,000. Pop. (1900) 8,463; (1910) 10,910.

Peru, a maritime republic of South America, bounded on the N. by Ecuador, on the W. by the Pacific, on the S. and S. E. by Bolivia and Chile, and on the E. by



Brazil; area, 695,720 square miles; pop. (1896) 4,609,999; capital, Lima.

Topography.—The general outline resembles a triangle, the base of which is formed by the boundary line between Peru and Ecuador on the N. On the E. side of the Andes, and between the Amazon and the Purus, there is a wide and unexplored expanse of country, upon which both Peru and Brazil have claims, though the boundary is now generally regarded as marked by the Rio Javary. The country is 1,100 miles in length, 780 miles in extreme width along the N. boundary, but it is little more than 50 miles wide in the extreme S. The islands on the Peruvian coast, though valuable, are extremely few in number, and small in extent. In the N. are the Lobos (*i. e.*, "Seal") Islands, forming a group of three, and so called from the seals which frequent them. The largest of them, Lobos de Tierra, is 5 miles long by 2 miles wide, and the others, lying 30 miles S. W., are much smaller. On their E. sides they are covered with guano, and the quantity on the whole group, when it began to be exported from them, was stated to be 4,000,000 tons. The islands of Macabi and Guanope, near the Lobos, were originally supposed to contain 2,280,000 tons of guano; but the guano exported has very greatly exceeded that amount, and it has been calculated that

Peru

there are still 750,000 tons of guano on the former and 500,000 tons on the latter.

Physical Features.—The surface of Peru is divided into three distinct and well defined tracts or belts, the climates of which are of every variety, from torrid heat to Arctic cold, and the productions of which range from the stunted herbage of the high mountain slopes to the oranges and citrons, the sugar canes and cottons of the luxuriant tropical valleys. These three regions are the Coast, the Sierra, and the Montaña. The Sierra embraces all the mountainous region between the W. base of the maritime Cordillera and the E. base of the Andes, or the East Cordillera. These ranges are, in this country, about 100 miles apart on an average, and have been estimated to cover an area of 200,000 square miles. Transverse branches connect the one range with the other, and high plateaus, fertile plains, and deep tropical valleys lie between the lofty outer barriers. The mountain chains which girdle the plain of Titicaca trend toward the N. W., and form what is called the Knot of Cuzco; the Knot comprises six minor mountain chains, and has an area thrice larger than that of Switzerland. Here the valleys enjoy an Indian climate, and are rich in tropical productions; to the N. and E. of the Knot ex-



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tend luxuriant forests, while the numberless mountain slopes are covered with waving crops of wheat, barley, and other

cereals, and with potatoes; and higher up extend rich pasture lands, where huge herds of vicunas and pacas feed. The valley of the Apurimac is 30 miles in average width, and extending N. W. for about 300 miles. This valley is the most populous region of Peru. From Cuzco proceed two chains toward the N. W.; they unite again in the Knot of Pasco. This Knot contains the table-land of Bombon, 12,300 feet above the sea-level, as well as other table-lands at a height of 14,000 feet, the highest in the Andes; otherwise, however, the physical features of the country resemble those of the vicinity of Cuzco. The valley of the river Marañon, which is upward of 300 miles in length, is narrow, deep, and nearer the equator than any other valley of the Sierra, and consequently it is the hottest portion of this region, and its vegetation is thoroughly tropical in character. The conformation of the surface of the Sierra is of the most wonderful description.

After the table-lands of Tibet, those of the Peruvian Andes are the highest in the world; but, unlike those of Tibet, the table-lands of Peru are the seat of a comparatively high civilization, and are studded over with towns and villages, perched on heights exceeding in elevation the summits of the Jungfrau and the Matterhorn. Nor are such towns the mere eyries of miners who are tempted to ascend thus high in search of the precious metals; for, even at this elevation, the climate is pleasant, and wheat, maize, barley, rye, and potatoes thrive well. The city of Cuzco, situated in a region of rare beauty, and enjoying a temperate climate, is 11,380 feet above sea-level, or 2,000 feet higher than the Great St. Bernard. The climate of the Sierra, however, is not always so delightful. In general terms it may be described as mild and variable, with moderate rains. In the district of Paucartambo rain falls 300 days in the year. A country, however, of such an uneven surface, of snow-covered peaks and tropical valleys, embraces every variety of climate. The highest peaks of the country reach to upward of 22,000 feet, and many peaks in both ranges are from 17,000 to 20,000 feet high. In the West Cordillera and in the S. of the country are four volcanoes—Candarave, Ubinas, Omate, and Arequipa. The hydrography of Peru may be said to be divided into three systems—those of Lake Titicaca, the Pacific, and the Amazon. The streams that flow into Lake Titicaca are few and inconsiderable. The rivers which, having their sources in the West Cordillera, flow W. into the Pacific, are 60 in number.

Commerce.—The total commerce of Peru for 1898 was valued at 82,052,621 soles (\$34,544,153); for 1899 the figures were

79,762,414 soles (\$34,935,937). The exports for 1898 amounted to 30,274,776 soles (\$12,745,680), for 1899 to 30,725,911 soles (\$13,457,949); and the imports for 1898 to 19,297,272 soles (\$8,124,152), for 1899 to 18,734,949 soles (\$8,205,908). These figures do not include the commerce of Iquitos, which amounted in the year 1899 to 5,384,635 soles (\$2,358,470). The exportation of mineral ores was valued at 10,667,012 soles (\$4,672,151). The gold standard is now permanently established in Peru. The nation has entered upon a new period of industrial activity. Numerous companies have been formed to explore the Amazonian region; new roads are being opened in every direction—one to the mines of Santo Domingo, one uniting the port of Paita with Pongo de Manseriche, and also one from Sieuani to the Inambari. There is marked confidence in the stability of order, and under the protection of peace old financial institutions and industrial and mining enterprises are thriving and public wealth is rapidly increasing.

Productions.—The wealth and resources of Peru consist not in its manufactures, but entirely in mineral, vegetable, and animal products. Of the precious metals, the production has greatly fallen off since Peru became an independent State. Nevertheless, Peru possesses vast metallic riches. The Andes abound in mines of gold, silver, copper, lead, bismuth, etc.; and in the Montana gold is said to exist in abundance in veins and in pools on the margins of rivers. The vegetable productions of Peru are of every variety, embracing all the products both of temperate and tropical climes. The European cereals and vegetables are grown with perfect success, together with maize, rice, pumpkins, tobacco, coffee, sugar cane, cotton, etc. Fruits of the most delicious flavor are grown in endless variety. Cotton, for which the soil and climate of Peru are admirably adapted, is now produced here in gradually increasing quantity. The land suited to the cultivation of this plant is excellent. The animals comprise those of Europe, together with the llama and its allied species.

Constitution and Government.—The republic of Peru, formerly the most important of the Spanish vice-royalties in South America, issued its declaration of independence July 28, 1821; but it was not till after a war, protracted till 1824, that the country gained its actual freedom from Spanish rule. The republic is politically divided into departments, and the departments into provinces. The present constitution, proclaimed Oct. 16, 1856, was revised Nov. 25, 1860. It is modeled on that of the United States, the legislative power being vested in a Senate and a House of Representatives,

the former composed of deputies of the provinces, in proportion of one for every 30,000 inhabitants or fraction exceeding 15,000, and the latter of representatives nominated by the electoral colleges of the provinces of each department, at the rate of two when the department has two provinces and one more for every other two provinces. The parochial electoral colleges choose deputies to the provincial colleges, who in turn send representatives to Congress, and elect the municipal councils, as well. The executive power is intrusted to a president. There are two vice-presidents, who take the place of the president only in case of his death or incapacity, and they are elected for four years. The president has to exercise his executive functions through a cabinet of five ministers, holding office at his pleasure. None of the president's acts have any value without the signature of a minister.

Religion and Education.—By the terms of the constitution there exists absolute political, but not religious, freedom, the charter prohibiting the public exercise of any other religion than the Roman Catholic, which is declared the religion of the State. But practically there is a certain amount of tolerance, there being in Callao and Lima Anglican churches as well as Jewish synagogues. By a late census there were 6,000 Protestants, 500 Jews, other religions 30,000. Elementary education is compulsory for both sexes, and is free in the public schools that are maintained by the municipalities. High schools are maintained by the government in the capitals of the departments, and in some provinces pupils pay a moderate fee. There is in Lima a central university, called "Universidad de San Marcos," the most ancient in America; its charter was granted by the Emperor Carlos V.; it has faculties of jurisprudence, medicine, political science, theology, and applied science. Lima possesses a school of mines and civil engineering, created in 1874, with good collections and laboratories. There are in the capital and in some of the principal towns private high schools under the direction of English, German, and Italian staffs. Lima has also a public library, with a rich collection, besides the one of the university and school of mines. There are two minor universities at Cuzco and Arequipa.

Revenue.—The public revenue was till recently mainly derived from the sale of guano, and from customs. Direct taxation exists in two forms, there being a poll tax, at the rate of four sols on the coast and two in the inland departments per annum, for every man between 21 and 60 years; a tax is levied, too, at the rate of 3 per cent., on the rent derived from real prop-

erty. Revenue (1899) \$8,510,760; expenditures, \$5,654,120.

History.—Peru, the origin of whose name is unknown, is now passing through its third historical era, and is manifesting its third phase of civilization. The present era may be said to date from the conquest of the country by the Spaniards in the early part of the 16th century; the middle era embraces the rule of the Incas; and the earliest era, about which exceedingly little is known, is that of pre-Incarial period of unknown duration, during which a nation, or nations, living in large cities flourished in the country, and had a civilization, a language, and a religion different, and perhaps in some cases even more advanced, than those of the Incas, who succeeded them and overran their territories. Regarding the origin of the Incas nothing definite can be said. There are no authorities on the subject save the traditions of the Indians, and these, besides being outrageously fabulous in character, are also conflicting. It appears, however, from all the traditions, that Manco, the first Inca, first appeared on the shores of Lake Titicaca, with his wife, Mama Ocilo. He announced that he and his wife were children of the sun, and were sent by the glorious Inti (the sun) to instruct the simple tribes. He is said to have carried with him a golden wedge, or, as it is sometimes called, a wand. Wherever this wedge, on being struck on the ground, should sink into the earth and disappear forever, there it was decreed Manco should build his capital. Marching N. he came to the plain of Cuzco, where the wedge disappeared. Here he founded the city of Cuzco, became the first Inca (a name said to be derived from the Peruvian word for the sun), and founded the Peruvian race, properly so called. The Peruvian system of agriculture was brought to its highest perfection only by the prodigious labor of several centuries. Not only was the fertile soil cultivated with the utmost care, but the sandy wastes of the coast, unvisited by any rains, and but scantily watered by brooks, were rendered productive by means of an artificial system of irrigation, the most stupendous, perhaps, that the world has ever seen.

Water was collected in lakes among the mountains, led down the slopes and through the sands of the coast, apparently doomed to sterility, by canals and subterranean passages constructed on a vast scale, and the ruins of which, to be seen at the present day, attest the industry, ingenuity, and admirable patience of the Peruvians. The aqueducts, which were sometimes between 400 and 500 miles in length, were in some cases tunneled through massive rocks and carried across rivers and marshes. They

Perugia

were constructed of large slabs of freestone, fitting so closely as to require no cement, and answering perfectly the purpose for which they were intended, for the sandy wastes were converted into productive fields and rich pasture lands, and the coast teemed with industrious inhabitants. In the valley of Santa there were once 700,000 inhabitants; there are now only 12,000; in that of Ancullama there were 30,000 individuals; there are now only 425. The edifices of Incarial times are oblong in shape and cyclopean in construction. The materials used were granite, porphyry, and other varieties of stone; but in the more rainless regions sun-dried bricks were also much used.

The religion of the Peruvians, in the latter ages of the empire, was far in advance of that of most barbarous nations. They believed in a Great Spirit, the Creator of the universe, who, being a spirit, could not be represented by any image or symbol, nor be made to dwell in a temple made with hands. They also believed in the existence of the soul hereafter, and in the resurrection of the body. The after life they considered to be a condition of ease and tranquillity for the good, and a continual wearisome labor, extending over ages for the wicked. But while they believed in the Creator of the world, they also believed in other deities, who were of some subordinate rank to the Great Spirit. Of these secondary gods the sun was the chief. They revered the sun as the source of their royal dynasty; and everywhere throughout the land altars smoked with offerings burned in his worship.

Perugia, ancient Perusia, a town of Central Italy, capital of the province of the same name, 84 miles N. of Rome. It is beautifully situated on an eminence above the Tiber, has irregular but spacious streets, and is surrounded by old walls. It is rich in art and literary treasures, and has many remarkable buildings, including a Gothic cathedral of the 15th century, a number of churches and monasteries, a town hall (Italian-Gothic, begun 1281), and a university, founded in 1307. The manufactures, not of much consequence, consist of velvet, silk stuffs, etc. Perugia was an old Etruscan city, and was conquered by Rome in 310 B. C. Pop. 61,385. The province of Perugia has an area of 3,719 square miles, and is very fertile. It is traversed in all directions by offsets of the Apennines. The principal stream is the Tiber. Pop. (1909) 699,035.

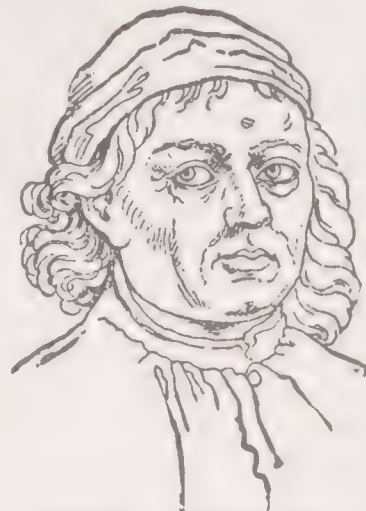
Perugia, Lago di, or Lago Trasimeno, a lake in Italy, 9 miles W. of Perugia, about 8 miles long, varying in breadth from 7 miles to 4 miles, surrounded with olive

Pesaro

plantations. It contains three islands, and abounds in fish. It has no visible outlet.

Perugino, Pietro, an Italian painter; born in Leitta Della Pieve, about 1446. His real name was Pietro Vanucci, but becoming

a citizen of Perugia, he acquired the name by which he is best known. He studied under Verrocchio, and soon attained great distinction as a painter in oil by his rich coloring. He was employed for 10 years in the Sistine Chapel and the Stanze of the Vatican, and on his return to



PIETRO PERUGINO.

Perugia opened a school, and had Raphael among his pupils. Perugino was a sordid and eccentric man; adhered obstinately to the stiff conventional forms of the 15th century, and in his latter years produced many works, unworthy of him, for gain. His best work is the "Pietà," in the Pitti Palace. Among his best works are an "Ascension," at Lyons; the "Infant Christ Adored by the Virgin," at Rome; "Madonna Enthroned," at Bologna; and the fresco of the "Baptism" in the Sistine Chapel. He died in 1524.

Perusia. See PERUGIA.

Peruvian Balsam, in botany and commerce, the balsam flowing from incisions in the trunk of *Myroxylon pereiræ*. It is a thick, viscid, almost opaque, balsam, like molasses, with a reddish hue, and translucent when in thin layers; its odor fragrant, its taste acrid, but aromatic. It is brought from San Salvador, in South America. In pharmacy, is used as a stimulant and expectorant in chronic bronchitis, rheumatism, also to arrest excessive discharges from the urethra, and as an external application to stimulate bedsores and ulcers.

Peruvian Bark. See BARK, PERUVIAN.

Peruzzi, Baldassari, an Italian architect and painter; born in Sienna, Italy, in 1481. He went early to Rome and was employed in the decoration of various churches. He designed the Farnesina Villa on the banks of the Tiber, and he succeeded Raphael as architect of St. Peter's. After the sack of Rome he returned to Sienna, where he was made city architect. In 1535 he was again in Rome, and henceforward devoted himself entirely to architecture. His best existing works in fresco are at Sienna. He died in Rome, in 1537.

Pesaro, ancient Pisaurum, a town of Italy, on the right bank of the Foglia, here

crossed by a bridge of Trajan's age, 1 mile from the Adriatic and 37 miles N. W. of Ancona. Its streets are broad, and adorned with palaces and churches, and the town is surrounded with walls and defended by a citadel (1474) and a fort. It is a bishop's seat; there are two cathedrals, one new, the other old. Silks, pottery, iron, and leather are manufactured; and an active trade is carried on in these goods and in wine, olive oil, and fruits. The city is associated in literary history with the name of Tasso, some of his MSS. being preserved in one of the town museums; it is also the birthplace of Rossini. Made a Roman colony in 184 B. C., it was destroyed by the Goths; then, having been rebuilt by Belisarius, it became one of the Pentapolis. From 755 to 1285 it belonged to the Popes, then to the Malatestas till 1445, then to the Sforzas and Delle Roveres, in 1631 again to the Popes, and finally in 1860 to Italy. Pop. (1909) 25,103.

Pescherais, a tribe of Indians, inhabiting Tierra del Fuego, and both borders of the Straits of Magellan, from the island of Elizabeth and Port Famine, toward the E. as far as the group of islands which spread out to the N. and S. of the Straits of Magellan. Their complexion is olive, and they have huge forms and large chests, though otherwise well formed. They are a nomadic people, and only subsist by the chase and fishing.

Peschiera, a fortress of Italy, a member of the Quadrilateral, stands partly on an island in the Mincio and partly on the right bank of that river, at its outlet from the Lake of Garda, 14 miles W. of Verona and 77 E. of Milan. Besides a strong citadel and an arsenal, there is a fortified camp. The fortress has played a prominent part in the warlike events which have taken place in North Italy, especially after the Napoleonic wars began down to 1859.

Peschito, or **Peshito**, the old Syriac version of the Scriptures, made probably about 200 A. D. The Old Testament, as well as the New, seems to have been translated by one or more Christians, not by Jews. The former was made apparently from the Hebrew, the latter from the Greek. The Second and Third Epistles of John, Second Epistle of Peter, Jude, and the Revelation are wanting. The apocryphal books were not in the original edition, but they were added at an early date. The Peschito is of great value for critical purposes.

Peseta, the Spanish money unit, equivalent to a franc.

Peshawar, or **Peshawur**, a town of India, 10½ miles from the entrance of the Khyber Pass, 190 E. by S. of Kabul, and 276 N. W. of Lahore. Though a frontier town and occupying a strategic position of the utmost importance, its only defenses

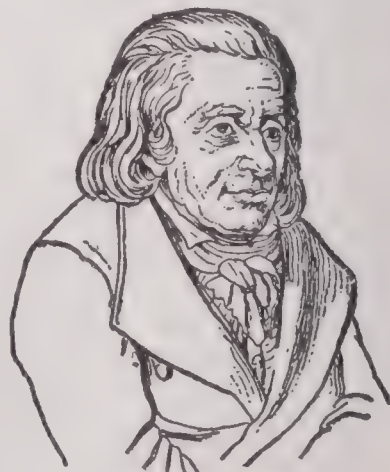
are a mud wall and a small fort; but 2 miles W. of the city are the cantonments, with a garrison of six regiments and a battery of Royal Artillery. Peshawar is the seat of extensive commerce between Afghanistan and India; gold, silver, lace, hides (all four from Bokhara), horses, mules, fruits, woolen and skin coats (all five from Kabul) being exchanged for tea, English piece-goods, wheat, salt, rice, butter, oil, and sugar. Pop. (1901) 95,147.

Peshito. See PESCHITO.

Peso, a silver coin and money of account used in Mexico and other parts of Spanish America, and often considered equivalent to a dollar.

Pessimism, that mental attitude which induces one to give preponderating importance to the evils and sorrows of existence; the habit of taking a gloomy and desponding view of things. Also the name given to the system of philosophy denounced by Schopenhauer (1788-1860) in "The World as Will and Idea" (of which the first volume was published in 1819, and the second some 25 years after), and by Von Hartmann in his "Philosophy of the Unconscious" (1860), though the feelings to which these writers gave utterance had previously a wide range both in time and space. The belief that "the times are very evil" has found expression in almost every philosophic and religious system at one period or other of its existence. But it was at the beginning of the 19th century that pessimism began to create a literature of its own, and to impart a somber hue to the writings of men not avowedly its disciples. As examples may be cited Byron's "Euthanasia" and Heine's "Fragen." The adherents of this philosophy have for the most part belonged to the German races, Leopardi (1798-1837) being the sole Latin writer of note who has advocated pessimist theories.

Pestalozzi, Johann Heinrich, a Swiss philanthropist and educational reformer; born in 1746; first studied theology, then law; and subsequently became concerned in a calico manufactory. Afterward he devoted his time and substance to the children of paupers, whom he collected in large numbers in his own house, and this good work he carried on for over 20 years without outside



PESTALOZZI.

aid or even sympathy. The want of means at last compelled him to abandon

his gratuitous institution, and to seek pupils who could pay for their maintenance and instruction. After a few years' successful teaching in various places he opened a school in the Castle of Yverdun (canton Vaud), which the government had placed at his disposal. His novel "Lienhardt and Gertrud" (1781-1789), exerted a powerful moral influence, while his educational treatises have laid the foundation for the more rational system of elementary instruction which now obtains in Europe. The grand principle that lay at the basis of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study in such a way that each step should best aid the further progress of the pupil. He died in 1827.

Pesth. See BUDAPEST.

Petal, in botany, one of the divisions of a corolla consisting of several distinct pieces. It is a modification of a leaf. It is generally larger than the calyx, and, unlike it, is as a rule brightly colored, *i. e.*, white, red, blue, yellow, or some of the hues produced by their intermixture. Sometimes the margins of the petals unite.

Petalite, a monoclinic mineral, rarely occurring in crystals, but mostly in cleavable masses. Hardness, 6.65; sp. gr., 2.39-2.5; luster of principal cleavage face, pearly, elsewhere vitreous; color, white, reddish, gray; fracture, when obtained, conchoidal. Composition: Silica, 7.77; alumina, 17.8; lithia, 3.3; soda, 1.2=100. The crystallized form is the castorite. Found on the Isle of Utö, Sweden, and at a few other localities. Related to spodumene.

Petard, a machine formerly used for blowing open gates or barriers in fortifications. It was bell shaped, charged with powder, and fired by a fuse. The mouth of the machine was placed against the obstacle, and kept in place by struts or by being hung on a hook driven into the woodwork. The petard has fallen into disuse.

Petavius, Dionysius, the name by which the French Catholic theologian Denys Petau is usually known; born in Orleans, France, Aug. 21, 1583; he studied at Orleans and Paris, became a teacher in the University of Bourges in 1602, in 1605 entered the order of Jesuits, and 1621 was made Professor of Theology in the University of Paris. This post he held for 22 years, but in 1646 he retired and devoted himself to the completion of a remarkable series of works in philology, history, and theology. Of his 49 works among the best known are editions of "Synesius" (1611),

and "Epiphanius" (1622); "Doctrines of the Times" (1627); "Chronological Accounts" (1628); an outline of universal history (1634); and "History of Doctrines" (1644-1650); besides polemical works against Grotius and Salmasius. He died in Paris, Dec. 11, 1652.

Petchora, a large river in the N. of European Russia, rises on the W. slope of the Urals, flows N. through the E. parts of the governments of Vologda and Archangel, then S. E. for about 150 miles, and finally sweeping toward the N, and expanding into an estuary 30 miles wide and full of islands, falls into the Arctic Ocean, after a course of over 1,000 miles. It is navigable by boats for upward of 700 miles. The country through which the river flows is thinly peopled and quite uncultivated; dense forests extend on both sides, and the character of the scenery is wild, somber, and melancholy.

Petechiæ, spots formed by extravasated blood, as in typhoid, putrid and malignant fevers, hemorrhagic smallpox, etc.

Peter, the Greek surname of an apostle of Jesus. It is the rendering of the East Aramæan *kepha*, a corruption or derivation from Heb. *keph*=a rock (Job xxx: 6; Jer. iv: 29), and was given by Jesus (John i: 40-42). Transliterated into Greek, with a termination, it became *Kēphas* (Gal. ii: 9). Peter's real name was Simon (Matt. xvii: 25; Luke iv: 38, v: 3, 5, etc.), his father's Jonas (John xxi: 15), his brother's Andrew (Matt. iv: 18). Peter was born at Bethsaida (John i: 44), but had removed to Capernaum, where he had a house, being a married man (Matt. viii: 14; Mark i: 30; Luke iv: 38; I Cor. ix: 5). For his call to be an apostle, see Matt. iv: 18; Mark i: 16-18; Luke v: 1-11; John i: 35-42. Three of the 12 were selected on three occasions by Jesus for special honor (Mark v: 37; Matt. xvii: 1, xxvi: 37), Peter's name standing first, though John was the disciple whom Jesus loved (John xix: 26, xx: 2, xxi: 20, 24). The Power of the Keys was first bestowed on him (Matt. xvi: 13-20), though afterward also on the other apostles (xviii: 1). Peter was of an impulsive temperament, generous, but too forward in speech (xvi: 22, 23), and rash in action (John xviii: 10). It was not natural cowardice, but because through his rashness he had committed himself, and was in danger of arrest, that made him deny his Lord (Matt. xxvi: 51-75). After the Ascension, he was for a time the most prominent of the apostles (Acts i: 15, ii: 14, etc., iii: 1-26; iv: 8, 9, v: 1-16), and though specially sent to the Jews (Gal. ii: 8), yet had the privilege of being the first to admit Gentiles into the Church (Acts x: 1-48). Afterward he was somewhat cast into the shade by the eminence of St. Paul,

and on one occasion dissembling his liberal views when in narrow Judaic company, was withstood by St. Paul to the face "because he was to be blamed" (Gal. ii: 11). Tradition makes him die as a martyr at Rome, about A. D. 64, crucified with his head downward. Roman Catholics claim him as the first Bishop of Rome, and consider that the authority delegated him by Jesus apper-



DONATELLO'S STATUE OF ST. PETER, IN FLORENCE.

tains also to his successors, the Popes of Rome.

The First Epistle General of Peter, an epistle which claims to have been written by the Apostle Peter (i: 1), apparently from Babylon (v: 13), "to the strangers scattered throughout Pontus, Galatia, Cappadocia, Asia, and Bithynia" (i: 1), all places in Asia Minor. These strangers were

obviously Christian converts, the majority apparently Gentiles (i: 14, ii: 10, iv: 3). Their churches were in charge of elders (v: 4). They were in suffering (i: 6), which the apostle foresaw would deepen into severe persecution (iv: 12-18). He exhorts them to steadfastness, to careful avoidance of crime and scandal (ii: 12, iv: 15), to humility (v: 5-6), and the proper observance of their duties of subjects, servants, husbands or wives, brethren in a natural or spiritual sense (ii: 13—iii: 8), office-bearers, or members in Christian churches (v: 1-5). The epistle was probably carried by Silvanus (v: 12). St. Mark seems to have been with Peter when it was written (v: 13). Its date is uncertain, probably between A. D. 60 and A. D. 64. There is strong evidence for its authenticity, which has rarely been doubted.

The Second Epistle of Peter, another epistle claiming to have been penned by the Apostle (i: 1), the author also referring to the transfiguration scene as one which he personally witnessed (i: 17, 18), and to a previous epistle (iii: 1). In this second letter he seeks to establish Christians in the faith, warns them against false teachers, and predicts the general conflagration of the world. Its style is different from that of the first. The language and sentiments of ch. ii. and part of iii. resemble Jude. When it was published, the epistles of St. Paul had been collected, and formed part of New Testament Scripture (iii: 15-16). The evidence for its authenticity is much less strong than that for the first epistle. Clement of Alexandria seems to have known it. It is not in the Peschito; Cyprian ignored it; Origen and Eusebius placed it among the controverted writings, but it gradually obtained acceptance before the close of the 4th century.

Peter I. Alexeievitch, called **PETER THE GREAT**, Emperor of Russia; born in Moscow in 1672; became joint ruler with his brother Ivan in 1682, and in 1689 obtained almost sole authority through the virtual retirement of Ivan. From 1696 he ruled altogether alone. After suppressing a conspiracy of the Strelitz (*q. v.*) against his life, in which he displayed much courage, he traveled in foreign countries, not in the character of czar, but as a member of an embassy. At Amsterdam he worked, *incognito*, in a shipyard, went to the village of Zaandam, where he caused himself to be enrolled among the workmen, under the name of Peter Mikhailov. Here he lived in a little hut for seven weeks, made his own bed, and prepared his own food, corresponded with his ministers at home, and labored at the same time in shipbuilding. Induced, by his love for the sea, to accept the invitation of William III. to visit London, he spent some weeks

Peter

there, keenly observing and learning all that he could of trade, manufactures, and the arts. Having proceeded to Vienna, he there received intelligence of a new rebellion of the Strelitz, on which he returned home, crushed the insurrection, and visited the rebels with fearful severity. In



PETER THE GREAT.

1700 he entered upon a war with Sweden, which lasted till 1721. He was defeated by his great rival, Charles XII., at the battle of Narva, and the war went on with various results till 1709, when he completely defeated Charles at Poltava. In the following year the Sultan declared war on him, and he narrowly escaped capture by the Turks in the campaign of 1711. This war ended in 1713. Not satisfied with his immense power as czar, Peter had suppressed the patriarchate, and made himself head of the church as well as of the state. In 1703 he founded St. Petersburg, and began the fortifications of Cronstadt. Three years later he privately married Catharine, a girl of low origin and immoral character; married her publicly in 1712, and had her crowned in 1724. Peter extended the limits of the empire both in Europe and Asia; changed the face of Russia by his zealous promotion of trade, navigation, manufactures, and education; effected an immense change in the manners and customs of the Russians; and after the conclusion of peace with Sweden, received the title of Emperor of all the Russias, and Father of his Country. Reforming others, he failed to reform himself, but remained to the last an ignorant, coarse, brutal savage, indulging in the lowest vices, and gloating over scenes of cruel suffering. He would sometimes put his victims to the torture, play judge and executioner too, and, drunk with wine, strike off 20 heads in succession, proud of his horrid dexterity. His state policy has been adhered to by his succes-

Peterborough

sors. Peter I. died in St. Petersburg, after very severe suffering, Jan. 28, 1725.

Peter II., Emperor of Russia; born in 1714; the son of Alexis and grandson of Peter the Great. He succeeded, in 1727, the Empress Catharine, who had declared him Grand Duke of Russia the year preceding. The most remarkable event of his reign was the disgrace of the prime minister Menschikoff, who was banished to Siberia. He died in 1730.

Peter III., Emperor of Russia; the son of Anne, eldest daughter of Peter the Great; born in 1728; succeeded Elizabeth in January, 1762. He married the Princess Sophia Augusta of Anhalt-Zerbst, whose name he changed to Catharine. Inspired with grand and martial thoughts, he attempted to govern his empire on the model of Frederick the Great; but, wanting capacity, energy, and courage, he signally failed in all his schemes. His empress, being apprised of his intention of divorcing her and bastardizing his son Paul, anticipated his design, and, exciting a revolution, entirely defeated his scheme, took him prisoner, and compelled him to sign a most humiliating abdication. After this, being



PETER III.

sent to the fortress of Ropsha, there he is said to have been strangled by Alexis Orloff and others, July 17, 1762.

Peter, Karl Ludwig, a German historian; born in Freyburg on the Unstrut, Germany, April 6, 1808. Among his works are: "Epochs in the History of the Roman Constitution" (1841); "Studies in Roman History" (1863); "Criticism of the Sources of Ancient Roman History" (1879). He died in Jena, Aug. 11, 1893.

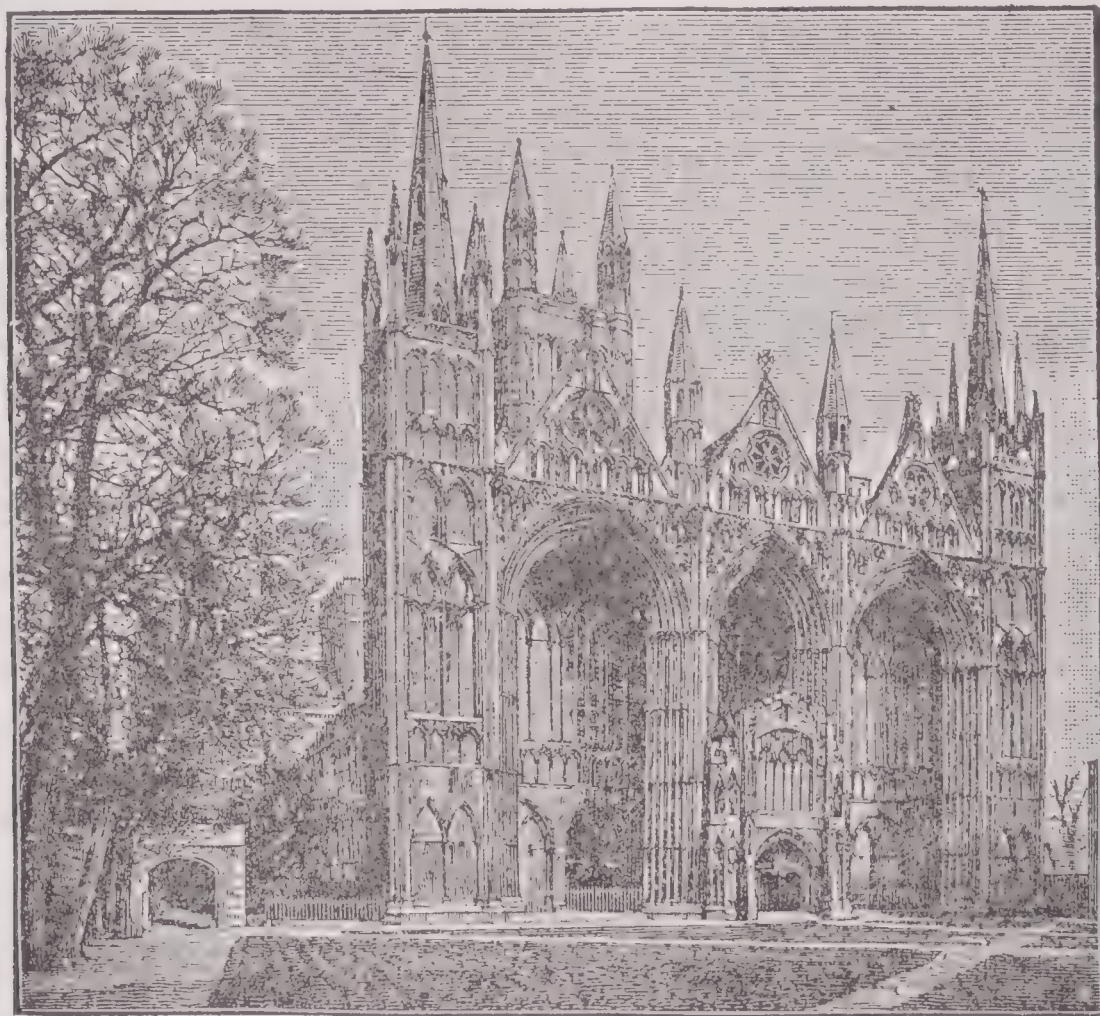
Peterborough, a city partly in Huntingdonshire, but chiefly in Northamptonshire, England, the latter portion being on the left or N. bank of the Nen river, at the edge of the fen country, 76 miles N. of Lon-

Peterborough

don. Here, at Medeshamstede, in 655, the Mercian thane Saxulf founded the great Benedictine abbey of SS. Peter, Paul, and Andrew, which, destroyed by the Danes in 870, was restored in 966, plundered by Hereward in 1069, and again burned down in 1116. Its noble church, the cathedral since 1541 of a new diocese carved out of that of Lincoln, was built between 1118 and 1528, and thus, while essentially Norman, offers every variety of architecture down to the Perpendicular. It is 471 feet long, by 202 across the transept, and 81 high. The Early English W. front (1200-1222) consists of three mighty arches, and "is perhaps," says Freeman, "the grandest con-

Peterborough

Cumberland, Archbishop Magee of York, and Mandell Creighton the historian. Paley was a native. Two ancient gateways, the bishop's palace and the deanery (once the abbot's and prior's houses), and the chancel of a Becket chapel (now a museum) make up the remaining objects of interest. A training college for schoolmasters (1864), a grammar school, the town hall (1671), the corn exchange (1848), a cattle market of five acres (1867), and the bridge over the Nen (dating from 1140, but in its present form from only 1872) may be mentioned. Peterborough is an important railway center, has manufactures of agricultural implements, and carries on a large trade in



PETERBOROUGH CATHEDRAL: WEST FRONT.

ception for a single feature which mediæval architecture has produced, a Greek portico translated into Gothic language." Noteworthy also are the flat painted wooden ceilings of the 12th century, the portrait of "Old Scarlett" the sexton (1496-1594), the blue slab inscribed "Queen Catharine, A. D. 1536," and the grave for 25 years (1587-1612) of Mary Queen of Scots. In 1643 Cromwell and his troopers did hideous havoc to monuments, stained glass, and cloisters. In 1883 the fine central tower was condemned as unsafe; but it has been lovingly rebuilt, and in 1890 the cathedral was reopened after restoration. Of the abbots may be mentioned Ernulf, Bishop of Rochester (1115); and of the 27 bishops, Lloyd and White the non-jurors, Richard

malt, coal, farm produce, etc. Incorporated as a municipal borough in 1874, it has returned two members to Parliament from 1547 till 1885, and since then one. Pop., (1901) 30,872.

Peterborough, a city of Ontario, Canada, the county-seat of Peterborough co.; on the Otonabee river, and on the Grand Trunk and Canadian Pacific railways, 85 miles N. E. of Toronto. The Trent Valley waterway system, by which Lake Ontario and Georgian bay are connected through a series of short canals, rivers, and lakes, was not wholly completed in 1907. In that year these waters were navigable 100 miles to the N. of the city and 50 miles to the S. The hydraulic lift lock at Peterborough, the largest in the world, lifts vessels 65 feet

Peterborough

and sends them on their way in 8 minutes. The surrounding district has many pretty lakes and rivers attractive to tourists and sportsmen, and its mineral lands contain gold and iron ore. The city is well laid out, having wide and regular streets. The noteworthy buildings are the public library, provincial normal school, Young Men's Christian Association building, Grand Opera House, Collegiate Institute, Dominion Government buildings—containing the post, the customs, and the inland revenue offices—and some of the churches and hotels. A fine bridge connects the city with Ashburnham, a village across the river, which was recently annexed. There are 2 large parks and several smaller ones, and beautiful and popular summer resorts are within easy distance of the city on Chemong, Stony, Buckhorn, Rice, and other lakes and on the Otonabee river. There are 12 churches. The educational and charitable institutions include the provincial normal school, Collegiate Institute, and 9 public schools, a business college, Victoria Museum in Nicholls park, the public library, Nicholls and St. Joseph hospitals, House of Providence, and Protestant Home. There are 3 daily newspapers, which publish weekly editions. The manufacturing industries are important. Within a few miles the Otonabee river falls 150 feet, affording power for numerous mills, engineering works, and other factories. The leading industrial establishments employ over 3,000 hands, and the principal manufactures are electrical machinery and supplies, lumber, cereal foods, sawmill and mining machinery, locks, cordage, woolen goods, agricultural implements, carpets, harness and saddlery, canoes and other boats, sails, tents, etc. The manufactured output for 1906, according to the Dominion census, amounted in value to \$11,566,805, as compared with \$3,789,164 for 1901, an increase of 205 per cent. There is a considerable export trade in lumber, grain, and cheese. The surplus of the city's assets over liabilities in 1906 was \$173,000. Peterborough was first settled in 1818. It was incorporated as a town in 1860, and as a city in 1905. Pop. (1901) 11,239; local est. (1907) 15,500.

Peterborough, Charles Mordaunt, Earl of, an English military officer; born about 1658; succeeded his father, Lord Mordaunt, 1675, and his uncle in the earldom of Peterborough, 1697. William of Orange created him Earl of Monmouth, and appointed him first commissioner of the treasury for his services in connection with the dethronement of James II. He eminently distinguished himself in Spain as a commander in the Spanish Succession war, 1705, especially by the capture of Barcelona, and received the thanks of the British Parliament. He also held several diplomatic posts; was created a Knight of the Garter, 1713, general of

Peter Martyr

the British marine forces, 1722, and died in 1735 on a voyage to Lisbon.

Peterhead, a seaport of Aberdeenshire, Scotland, on a peninsula, 44 miles N. N. E. of Aberdeen. Founded in 1593, it is largely built of the celebrated reddish "Peterhead granite." The general trade is considerable, and granite cutting and polishing and ship-building are among the industries. But the town is known chiefly for its herring fisheries. In 1715 the Old Pretender landed here. Pop. (1901) 11,750.

Peterhof, a palace of the emperor of Russia, on the S. shore of the Gulf of Finland, 18 miles W. of St. Petersburg; built by Peter the Great in 1711; contains a fine collection of paintings, and is surrounded by beautiful parks and gardens laid out on the model of those at Versailles, with cascades, terraces, and summer houses. Pop. 14,298.

Peterloo Massacre, the name popularly given to the dispersal of a large meeting by armed force in St. Peter's Field, Manchester, England, on Aug. 16, 1819. The assemblage, consisting chiefly of bodies of operatives from different parts of Lancashire, was called to consider the question of parliamentary reform, and the chair, on open hustings, was occupied by "Orator" Hunt. The dispersal took place by order of the magistrates; several troops of horse, including the Manchester Yeomanry, being concerned in the affair. Eleven persons (men, women, and children) were killed, and some 600 wounded. St. Peter's Field is now the site of the Free-trade Hall. "Peterloo" was a name suggested by Waterloo.

Petermann, August (pā'tēr-män), a German geographer; born in 1822. His first important work was a map for Humboldt's "Central Asia." He afterward assisted Keith Johnston in the preparation of his "Physical Atlas"; became a member of the Royal Geographical Society, and contributed to the "Encyclopædia Britannica," etc. In 1854 he became professor of geography at Gotha, and superintendent of Justus Perthes' geographical establishment, editing the "Mitteilungen," the foremost among geographical magazines. He died in Gotha in 1878.

Peter Martyr, the patron saint of the Inquisition, a Dominican of Verona, who, for the severity with which he exercised his inquisitorial functions, was in 1252 slain at Como by the infuriated populace. His death formed the subject of a masterpiece by Titian, destroyed by fire in Venice in 1867.

Peter Martyr, an Italian reformer; born in Florence, Italy, Sept. 8, 1500; entered at 16 the order of the canons regular of St. Augustine at Fiesole, studied at Padua, and became abbot of Spoleto, and later prior of St. Peter at Aram near Naples. Here he was drawn into the doc-

Peter

trines of the Reformers by the teaching of Juan Valdes and Ochino, yet was appointed visitor-general of his order in 1541. His rigor made him hateful to the dissolute monks, and he was sent to Lucca as prior of San Frediano, but soon fell under the suspicions of the Inquisition, and had to flee to Zurich (1542). At Strasburg he was welcomed by Bucer, and made Professor of the Old Testament. In 1547 he went to England on Cranmer's invitation, lectured at Oxford on I Corinthians and Romans, and took an active part in the great controversy of the day. Mary's accession drove him back to Strasburg, then grown too Lutheran for his tastes, and at length in 1555 he repaired to Zurich, where he died, Nov. 12, 1562.

Peter Martyr Anglerius, a Spanish historian; born in Arona, Spain, in 1459, of an ancient family belonging to Anghera; obtained a footing at the court of Ferdinand and Isabella in 1487, and rose to high ecclesiastical preferment in Spain. He was ultimately named Bishop of Jamaica, and wrote "The New World" (1516), giving the first account of the discovery of America; "The Babylonian Legation" (1516); and "Book of Letters" (1530). He died in Granada, in 1525.

Peter, Parley. See GOODRICH, SAMUEL GRISWOLD.

Peter Pindar. See WOLCOT, JOHN.

Peters, Madison C., an American clergyman; born in Lehigh co., Pa., Nov. 6, 1859; studied at Muhlenburg and Franklin and Marshall Colleges and was graduated at Heidelberg Theological Seminary, Tiffin, O. Ordained to the ministry of the Reformed Church in 1880, he became pastor of the Bloomingdale Reformed Church, N. Y., but after a pastorate there of 11 years resigned to enter the Baptist Church and later became pastor of the Sumner Avenue Baptist Church in Brooklyn. He wrote "Justice to the Jew" (1899); "The Wit and Wisdom of the Talmud" (1900); "The Great Hereafter" (1897), etc.

Peters, Samuel Andrew, an American author; born in Hebron, Conn., in 1735; was ordained a minister in the Church of England at Hartford in 1760. In 1774 he sailed to England to escape persecution on account of his toryism, and in 1781 published the satirical "General History of Connecticut," which gave rise to the misconception as to "Blue Laws," which were in the brain of Peters instead of having ever having been on the statute books of Connecticut. He died in New York, in 1826.

Petersburg, a city and port of entry of Dinwiddie co., Va.; on the S. bank of the Appomattox river, the Upper Appomattox

Peter's Pence

canal, and on the Atlantic Coast Line and the Norfolk and Western railroads; 22 miles S. of Richmond. Here are the Southern Female College, the Petersburg Female College, the Central State Hospital for the Insane, Home for the Sick, Mechanics' Association Library, National and State banks, street railroads, electric lights, and daily and weekly newspapers. The handling of cotton and tobacco, with wheat, corn, and general country produce, is the chief business. The city has tobacco factories, cotton factories, flour and grist mills, and a distillery, and an assessed property valuation of over \$10,500,000. The so-called siege of Petersburg lasted from June 16, 1864, to April 2, 1865; and during its continuance 13 pitched battles were fought in the neighborhood. The intrenchments of Lee and Grant still form conspicuous features in the landscape; Grant's lines extended from the Appomattox to Fort Fisher, and thence E. to Fort Bross, a distance of 23 miles. One of the best-known engagements was that of the old crater, to the E. of the city, on Griffith's farm, where a small museum of war relics is exhibited. Pop. (1890) 22,680; (1900) 21,810; (1910) 24,127.

Petersen, Niels Mathias, a Danish historian; born in Sanderum in the island of Fynen, Oct. 24, 1791; was appointed Professor of Norse Languages in the University of Copenhagen in 1845. Among his numerous works are: "History of the Danish, Norwegian, and Swedish Languages" (1829-1830); "History of Denmark in Heathenism" (1854); "Norse Mythology" (1862); "History of Danish Literature" (1867-1871). He died in Copenhagen, May 11, 1862.

Peterson, Charles Jacobs, an American publisher; born in Philadelphia, in 1818; was the founder of "Peterson's Magazine," and the author of several popular novels. His works include: "Military Heroes of the United States" (1847); "Cruising in the Last War" (1849); "Grace Dudley" (1849); "Kate Aylesford" (1855); "Mabel" (1857). He died in Philadelphia, in 1887.

Peter's Pence, a tax of a penny on each house throughout England, which commenced in Saxon times as an occasional voluntary contribution, but was finally established as a legal tax under Canute, Edward the Confessor, and William the Conqueror. From being sent to Rome it was called by the Saxons rome-feoh, rome-scot, and rome-pennyng. The name Peter's pence arose from its being collected on St. Peter's Day. From being levied on every private and every religious house, the Abbey of St. Albans only excepted, it was called also hearth money. At first it was used chiefly

Peter the Cruel

for the support of an English college at Rome, then the Pope shared the gift with the college, and finally appropriated the whole. Edward III. forbade its being paid; but it was soon restored. An act of Henry VIII., passed in 1534, swept it away. A voluntary contribution raised among Catholics, and sent to the Pope for his private use.

Peter the Cruel, King of Castile and Leon; born in 1334; succeeded his father Alfonso XI., in 1350. His reign was one long series of cruelties and despotic acts. The year following his coronation he put to death Eleanora de Guzman, his father's mistress. In 1353 he married, though contrary to his will, Blanche of Bourbon, one of the most accomplished princesses of the time, whom, however, he abandoned two days after his marriage in order to rejoin his mistress, Maria Padilla. The queen was imprisoned and divorced, and his mistress's relations appointed to the highest offices. He then married the beautiful Juana de Castro, but only to abandon her after a few months. Two revolts against him were unsuccessful. On the second occasion, however, in 1366, Peter fled, and was dethroned, but he was reinstated the following year by an army lent by Edward the Black Prince. Executions and confiscations naturally followed, but these fresh cruelties only helped to swell the ranks of his opponents, of whom the chief was his half-brother Henry of Transtamara. In 1369 Henry gained a signal victory over Peter at Montiel, and the latter was slain in a sword combat with his brother. He died in 1369.

Peter the Hermit, a French gentleman of Amiens, in Picardy, who renounced a military life to embrace that of a pilgrim. At the end of the 11th century, a general alarm was spread that the last day was approaching; on which numbers of persons flocked to the Holy Land from all countries with a view of ending their days near the holy sepulcher. Peter was of the number, and on his return to Europe made so pathetic a representation of the state of the Christians in Palestine to Pope Urban II., that he gave Peter leave to preach up the necessity of a crusade throughout Christendom. The appearance, zeal, and eloquence of the hermit, produced a prodigious effect, and all ranks and ages, of both sexes, pressed eagerly into the service. With a motley army, estimated at 100,000 men, Peter passed through Hungary. In his absence, his followers attacked Solyman's army at Nicea, and all, except a few thousands, perished, "and," says Gibbon, "a pyramid of bones informed their companions of the place of their defeat." Peter remained in Palestine, and was at

the siege of Antioch in 1097; but on his attempting to make his escape, shortly afterward, was brought back, and compelled to take a new oath of fidelity and obedience to the holy cause. Two years later he was present at the siege of Jerusalem, where he displayed great bravery, and when the place was taken, was made vicar-general. Peter, on his return to France, founded the abbey of Neufmoustier, at Huy, in Liège, where he died in 1115.

Peterwardein, one of the strongest fortresses in the Austrian dominions; situated in a marshy, unhealthy locality on the right bank of the Danube; 44 miles N. W. of Belgrade; and connected with Neusatz opposite by a bridge of boats. The most ancient part of the defenses, the Upper Fortress, is on a rock of serpentine, which on three sides rises abruptly from the plain. The fortress was held by the Turks from 1526 to 1687. In 1688 the fortifications were blown up by the imperialists, and the town was soon after burned to the ground by the Turks; but at the peace of Passarowitz (1718) it remained in the possession of the emperor. Here, on Aug. 10, 1716, Prince Eugene obtained a great victory over the Grand Vizier Ali. The Hungarians were compelled to surrender the fortress to the Austrians in September, 1849.

Petiole, the leaf stalk of a plant, the part connecting the blade with the stem. It is generally half cylindrical, often channeled above, but in some monocotyledons it is cylindrical, and in others it is a sheath.

Pétion de Villeneuve, Jérôme, a French revolutionist; originally an advocate at Chartres, where he was born in 1753, was chosen deputy by the tiers-état of that city, to the States-General in 1789. In October he was made a member of the Committee of Public Safety; elected president of the National Assembly in 1790; appointed president of the criminal tribunal of Paris, and became mayor of Paris in 1791. After the death of the king he was nominated a deputy to the Convention; joined the Girondists; was impeached by Robespierre; escaped from prison, and died, it is supposed, from hunger, his body, in 1794, being found in a field in the department of the Gironde half devoured by wolves.

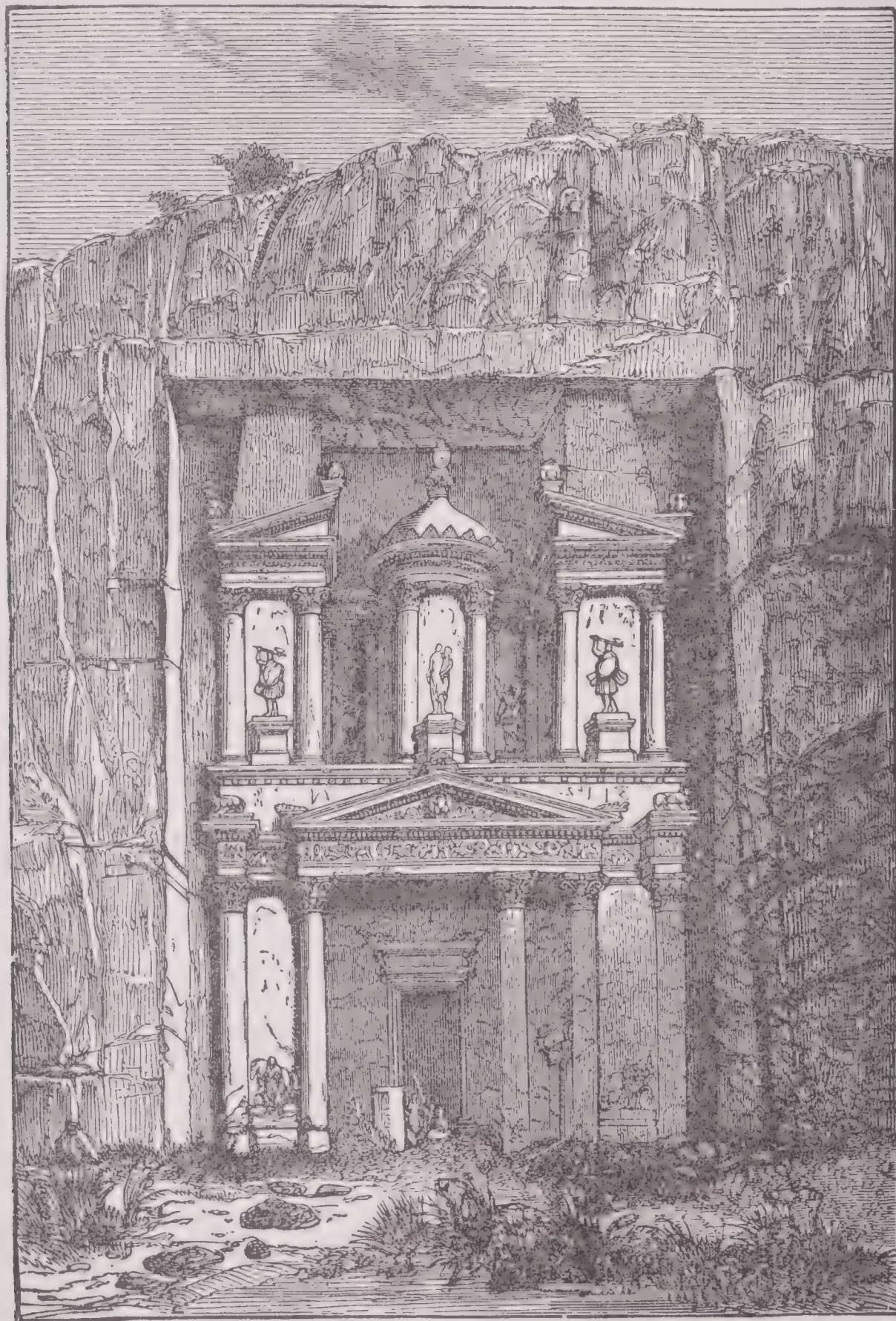
Petis de la Croix, François, a French Orientalist; born in Paris, in 1653; was secretary to the French ambassador in Morocco, and greatly assisted in negotiating the treaties of peace between France, Tunis, and Tripoli. From 1692 he was Professor of Arabic in the Royal College of France. He translated from the Persian "The Thousand and One Days" (1710-1712). His great work, "The History of Timur," from the Arabic of Ali Yazdi, was published nine

years after his death (1722), and translated into English in 1723. He died in 1713.

Petit de Julleville, Louis, a French historian of literature; born in Paris, July 18, 1841. He became Professor of French

menced the publication of a "History of the French Language and Literature," to be comprised in eight volumes.

Petition, an entreaty, a request, a supplication, a prayer; a solemn, earnest, or



A ROCK TOMB IN PETRA.

Literature in the Sorbonne. His principal work is "History of the Theater in France" (5 vols. 1880-1886); it is very full with regard to the old French theater. He gives in "The Theater in France" (1889) an account of the evolution of the French drama down to the present time. In 1896 he com-

pleted the publication of a "History of the French Language and Literature," to be comprised in eight volumes. **Petition**, an entreaty, a request, a supplication, a prayer; a solemn, earnest, or

Petition of Right

body, soliciting a favor, grant, right, or act of mercy. The paper or document containing such request or application; especially applied in legal language to an application to a court or judge, as a petition for a divorce.

Petition of Right, a declaration of the rights of the people put forward by the Parliament of England in the third year of the reign of Charles I., and assented to by him. They are: (1) That no man be compelled to pay any moneys to the state without common consent by act of Parliament. (2) That no person be imprisoned for refusing the same, nor any freeman be imprisoned without any cause showed, to which he might make answer. (3) That soldiers and mariners be not billeted in the houses of the people. (4) That commissions be no more issued for punishing by the summary process of martial law.

Petitio Principii, in logic, a vicious mode of reasoning popularly called begging the question, which consists in tacitly taking for granted as true the proposition to be proved, and drawing conclusions from it as though proved.

Petöfi, Sandor, a Hungarian poet; born in Kis-Körös, county of Pesth, Jan. 1, 1823; after school days was successively actor, soldier, and literary hack. His first poem, published in 1842, was followed by a volume in 1844 which secured his fame as a poet. He diligently studied German, French, and English, translated Shakespeare's "Coriolanus," but in 1848 threw himself heartily into the revolutionary cause, writing numerous popular war songs. His lyrical poetry breaks completely with the old pedantic style till then in vogue, and, warm with human and national feeling, began a new epoch in Hungarian literature. The first collected edition of his poems appeared in 1874; selections have been translated into English by Bowring and others. He fell in the battle at Schässburg (Segesvár), July 31, 1849 but it was long believed by the Hungarians that he had escaped, and would reappear.

Petra, a ruined city, formerly the Nabathæan capital of Arabia Petræa, in a narrow valley of the Wady Musa, about 110 miles S. S. E. of Jerusalem. It appears to have been a place of considerable extent and great magnificence, for its ruins, partly temples, etc., cut out of the solid rock, cover a large space. It seems to have been the Joktheel of the Old Testament, taken by Amaziah from the Edomites.

Petrarch, Francesco Petrarca, an Italian poet; born in Arezzo, Italy, in 1304. His father, a friend of Dante, and, like him, an exile from Florence, settled afterward at Avignon, and brought him up to

Petrarch

the law, for which he had no relish. He studied at Montpellier and Bologna, and afterward returned to Avignon, where his hopeless passion for the beautiful LAURA (*q. v.*), gave shape and color to the rest of his life. Petrarch took part in the political affairs of his time, was the friend of popes and princes, and was employed in many important negotiations. He rendered very great service to literature and learning by his diligent researches for, and collections of, ancient manuscripts and other remains; and by the gift of his books to the Church of St. Mark, Venice, he became the founder of its famous library. He was the friend of Boccaccio, who shares with him the honor of reviving classical literature; and the



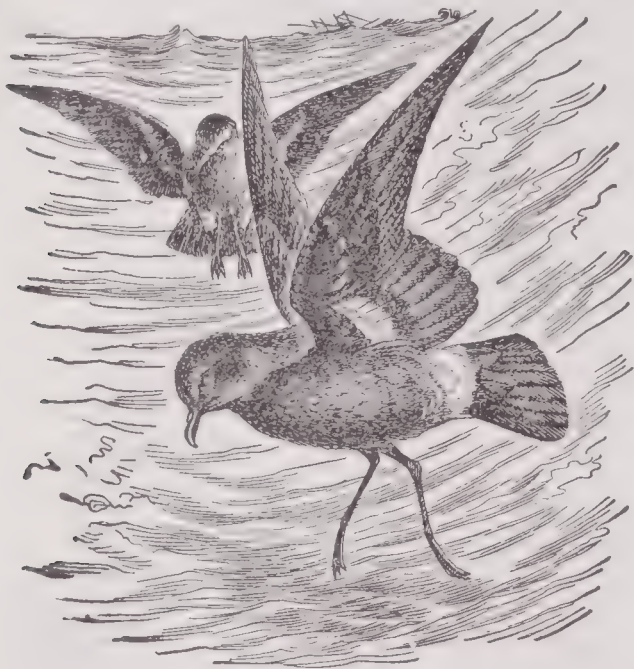
PETRARCH.

friend of Rienzi, with whose enterprise, as tribune of Rome, he warmly sympathized. In 1341 Petrarch received the highest testimony of the renown which he had acquired as poet and scholar, by being crowned as laureate in the capitol of Rome. Petrarch was at Rome during the Jubilee of 1350; lived afterward at Vacluse, Milan, Padua, Venice, and, in 1370, removed to Arquà, in the lovely Euganean Hills. Petrarch's works are partly in Italian and partly in Latin. The latter were those on which his reputation in his own day rested; but the former are those by which he is now most known. His Italian "Sonnets," "Canzoni," and "Triumphs," all sweet, exquisite, glowing variations on one theme, Laura, have placed him as one of the most celebrated of poets. He modelled the Italian sonnet, and gave to it, and to other forms of lyrical poetry, not only an admirable polish of diction and melody, but a delicacy of poetic

Petrel

feeling which has hardly ever been equalled, and a play of rich fancy which, if it often degenerates into false wit, is as often delightfully and purely beautiful. After long continued ill health, he died sitting among his books, July 18, 1374.

Petrel, a popular name for any individual of the family *Procellariidæ*, small oceanic birds of dusky plumage, nocturnal in habit, widely distributed, but most abundant in the Southern Hemisphere. They are considered by sailors as the harbingers of stormy weather, in which they seem to



STORMY PETREL.

delight. Many of them nidificate in holes and the majority lay but one egg, usually white. Some apparently come to land only for nidification, but nearly all are liable to be driven on shore by storms. *Estrelata hesitata*, the capped petrel, whose habitat is the West Indian Islands, has been met with in Hungary. *Procellaria* (*Thalassidroma*) *pelagica* is Mother Carey's chicken, or the storm petrel; *Cymochorea leucorhoa* is the fork-tailed, or Leach's petrel; and *Oceanites oceanicus* is Wilson's petrel.

Petrel, The, a single screw, steel gunboat of the United States navy; 892 tons displacement; length, 176 feet; breadth, 31 feet; mean draft, 11 feet, 7 inches; horse power, 1,095; armament, main battery, four 6-inch breech-loading rifles; secondary battery, one 1-pounder rapid-fire gun, two 37-millimeter Hotchkiss revolving cannons and two Gatlings; speed, 11.7 knots; crew, 10 officers and 122 men; cost, \$307,966.55. The "Petrel" was in the engagement with the Spanish fleet at Manila, May 1, 1898.

Petri, Laurentius, a Swedish reformer; born in Örebro, Sweden, in 1499; studied under Luther at Wittenberg; was made Professor of Theology at Upsala, and in 1531 first Protestant Archbishop of Upsala. Along with his brother Olaus he was chiefly instrumental in converting Sweden to

Petrified City

the Reformed doctrines, and with him superintended the translation of the Bible into Swedish (1541), a work that also helped to fix the language. He died in 1573. His brother OLAUS, born in Örebro in 1497, gained, a few years after his return (1519) from Wittenberg, the ear of Gustavus Vasa, who called him to the capital to preach the new doctrines, and eventually made him (1531) chancellor of the kingdom. This post he resigned in 1539, and spent the rest of his life as first pastor of Stockholm. He was a man of bold temperament, great activity, and powerful eloquence, and left several works, including memoirs, a mystery play, hymns, and controversial tracts. He died in Stockholm in 1552.

Petrie, William Matthew Flinders, an English Egyptologist, grandson of Captain Flinders, the Australian explorer; born June 3, 1853. He made measurements of prehistoric monuments in Great Britain (1875-1880); discovered and excavated the Græco-Egyptian city of Naukratis, in the Delta; and examined the interior of the pyramids at Hawara and Illahun. The results of his researches are found in "Stonehenge: Plans, etc." (1881); "Pyramids and Temples of Gizeh" (1883); "Tanis" (1885-1888); "Ten Years' Diggings in Egypt" (1892), a popular summary of his Egyptian work; "Six Temples at Thebes" (1892); etc.

Petrification, the act or process of petrifying or changing into a stone; the state of being petrified; conversion of any organic matter, animal or vegetable, into stone, or a substance of stony hardness. A "petrification" is not, strictly speaking, a transformation of the original animal or plant into stone. It is merely a replacement of the organic tissue by mineral substance. As each particle of the plant or animal decays and disappears its place is taken, usually in water or mud, by a particle of mineral matter deposited from the water which has held it in suspension. Thus the perishable original is changed into imperishable stone, preserving its form and even its structural appearance when cut into. By such means have the skeletons of animals millions of years old been preserved in the rocks of the everlasting hills, so that they may be reconstructed today as they were ages before man appeared on the earth. But it is only the bones that are in this way kept; never the flesh, because water can not percolate through it. In the same way whole forests of trees in the Yellowstone region and elsewhere are changed into agate and other forms of stone, the hollow logs of the forest primeval being often found filled with beautiful crystals of quartz and amethyst.

Petrified City, Ishmonie, a ruined city of Upper Egypt. Its popular name arose

Petrobrusian

from the fact that it contains a vast number of statues of human beings and animals in every possible posture, and which, according to a superstitious notion, were once living beings miraculously changed into stone.

Petrobrusian, the followers of Peter de Bruys, a Frenchman, who, about A. D. 1110, attempted religious reform. He was burned by an angry populace, at St. Giles', in 1130. The tenets attributed to him by Peter, Abbot of Cluny, who in 1141 wrote to confute him, were that persons should not be baptized till they reached years of discretion; that there should be no churches built, and that those already erected should be pulled down; that crosses should be abolished; that the sacred elements in the communion are only signs of the body and blood of Christ, and that the oblations, prayers, and good offices of the living do not profit the dead. Peter is regarded with much respect by some Protestants, who claim him as a reformer before the Reformation. His followers continued till the 16th century.

Petrography, the art of writing on stone. Also the study of rocks; a scientific description of or treatise on rocks; that branch of geology which deals with the constitution of rocks; petrology.

Petroleum, earth oil, naphtha, mineral oil, paraffin oil. A term applied to a variety of inflammable liquids found naturally in many parts of the earth and formed by the gradual decomposition of vegetable matter beneath the surface. These liquids vary in color from a faint yellow to a brownish-black, and in consistence from a thin transparent oil to a fluid as thick as treacle, and their sp. gr. ranges from .7-1.1. They are met with in most countries of Europe, but occur in abundance in Pennsylvania and other parts of the United States, and in Canada. Pelouzo and Cohours have shown that these oils consist mainly of homologues of marsh gas, and they were able to isolate by fractional distillation 12 members of the series, gaseous, liquid, and semi solid. A light petroleum oil is used all over the world for illuminating purposes, and a heavy oil for lubricating machinery. The total production of crude petroleum in the United States for 1908 was the largest on record, 179,572,479 barrels; valued at \$129,706,258. Oklahoma, California, and Illinois were the largest producers.

Petroleuse, a name given to the women of the French Commune of 1871, because they helped to burn the Tuileries, city hall, and other public buildings by pouring petroleum on them.

Petrology, the study of the mineralogical and chemical composition of rocks; including the various changes they have undergone through physical and chemical

Pettie

agencies, either combined or separate. Macroscopic and microscopic examination, together with chemical analysis, are the methods pursued. If the rock is of sufficiently coarse texture, an examination by an ordinary lens suffices, but in rocks of fine grain a thin section is prepared, and, under the microscope, the individual mineral constituents are recognized by their specific structural and optical characters. The chemical analysis is performed either on the rock as a whole, or the mass is pulverized, and the mineral species of which it consists separated by certain fluid chemical compounds of known density, and the products of this separation separately analyzed.

Petropaulovski, a fortified town on the E. coast of Kamchatka, was attacked by an English and French squadron, Aug. 30, 1854. They destroyed the batteries, but failed in taking some Russian frigates, except the "Sitka," a store ship taken by the "President," and a schooner taken by the "Pique." Admiral Price was killed, it is supposed, by the accidental discharge of his own pistol. A party of 700 sailors and marines landed to assault the place, but fell into an ambushade; many were killed, including Captain Parker and M. Bourasset, English and French officers. The objects of the attack were not attained, it is thought from want of stores. After this the Russians greatly strengthened their defenses, but on May 30, 1855, the allied squadron in the Pacific arriving here found the place deserted. The fortifications were destroyed, but the town was spared. The Russian ships escaped.

Petropavlovsk, a town of Asiatic Russia, in the province of Akmolinsk, on the river Ishim, 175 miles W. N. W. of Omsk. It is an important military station, with a fort founded in 1752, and has a large transit trade.

Petrozavodsk, a town of Russia, on the W. shore of Lake Onega, 300 miles N. E. of St. Petersburg, has a cannon foundry and small-arms factory, built in 1774, on the site of an iron work started by Peter the Great in 1703.

Pettenkofer, Max von, a German chemist; born near Neuburg, Dec. 3, 1818, studied at Munich, Würzburg, and Giessen, and in 1847 became Professor of Chemistry at Munich. He made many valuable contributions to science on subjects as various as gold-refining, gas-making, ventilation, clothing, the influence of soils on health, epidemics, and hygiene generally. Of separate works his "Handbook of Hygiene" is the best known. He died Feb. 10, 1901.

Pettie, John, an English painter, born in East Linton, near Haddington, England, in 1839; early became a student of art in the school of the Scottish Academy. His

first exhibited pictures were "The Prison Pet," at Edinburgh in 1859, and "The Armourers," at the Royal Academy in 1860. But the first work which showed his characteristic qualities of strong imaginative grasp of his subject, effective composition, and vigorous treatment was the "Drum-head Court-martial" (1864). Among the hundreds of later pictures, including portraits, may here only be named "An Arrest for Witchcraft" (1866), "Scene in the Temple Gardens" (1871); "Juliet and Friar Laurence" (1874); "The Death Warrant" (1879); "The Vigil" (1884); and "The Chieftain's Candlesticks" (1886). Pettie was elected A. R. A. in 1866, and R. A. in 1873. He died in Hastings, England, Feb. 21, 1893.

Petty, Sir William, an English political economist; born in Romsey, Hampshire, May 26, 1623; was educated partly at Caen, partly at the Universities of the Netherlands, and at Paris. His versatility and talent are evidenced by the positions he successively held, and the subjects he interested himself in; he taught anatomy and chemistry at Oxford (1648), and was made Professor of Anatomy there (1651); was Professor of Music at Gresham College, London; was physician to the army in Ireland (1652), executed a fresh survey of the Irish lands forfeited in 1641, started ironworks, lead mines, sea fisheries, and other industries on estates he bought in S. W. Ireland; was secretary to Henry Cromwell when he was lord lieutenant of that island; was made surveyor general of Ireland by Charles II., who knighted him; invented a copying machine (1647) and a double bottomed sea boat (1663); and in early life took much interest in education. In political economy he claims a place as one of the most important precursors of Adam Smith, on the strength of his "Treatise on Taxes and Contributions" (1662) and his "Political Arithmetic" (1691), the latter a discussion of the value of comparative statistics. He died in London Dec. 16, 1687.

Pettychaps, a name given to three or four small species of warblers of the genus *Sylvia*, such as the *S. trochilus* and the *S. sibilatrix*.

Petty Sessions, in England, sessions of two or more justices of the peace, on which power is conferred by various statutes to try minor offenses without a jury.

Petunia, a genus of American herbaceous plants, natural order *Solanaceæ*, nearly allied to tobacco. They are much prized by horticulturists for the beauty of their flowers.

Petuntze, a rock consisting largely of quartz, with some felspar, used in China for mixing with kaolin in the manufacture of porcelain.

Petworth Marble, a marble of Wealden age, occurring about 100 feet below the top of the Weald clay. It is used for architectural decoration, especially of churches. Called also Sussex marble, Paludina marble, and Paludina limestone.

Pew, a fixed seat in a church, inclosed and separated from those adjoining by partitions. Pews, originally square, are now generally long and narrow, to seat several persons.

Pewter. The finer pewter is an alloy of 12 parts tin, one part antimony, and a small quantity of copper; the coarser, of 80 parts tin and 20 of lead. The same ingredients as the finer pewter, but in different proportions (nine of tin to one of antimony) constitute Britannia metal. Pewter is a name also for a polishing material used by marble workers and derived from the calcination of tin.

Peyer's Glands, in anatomy, aggregate, small circular patches, surrounded by simple follicles, with flattened villi occupying the interspace. They are situated near the lower end of the ileum, and their ulceration is the pathognomonic characteristic of enteric or typhoid fever, hence their importance. They were discovered and described in 1677, by John Conrad Peyer, a Swiss anatomist.

Peyrebrune, Georges de — Mathilde Georgina Elisabeth de Peyrebrune de Judicis (pâr-brün'), a French novelist; born in Dordogne, France, in 1848; became one of the most popular women novelists in France, and wrote: "Gatienne" (1882); "Jean Bernard" (1883); "A Separation" (1884); "The Brothers Colombe" (1885), one of her best works; "A Decadent" (1888); "The Romance of a Bas-Bleu" (1892), showing the dangers of a literary career for women.

Peyton, Jesse Enlaws, an American patriot; born in Mayesville, Ky., Nov. 10, 1815. He assisted in the liquidation of Henry Clay's debts; was a founder of the Constitutional Union Party in 1860; was sent by President Lincoln on a mission to Kentucky to dissuade that State from seceding; and during the Civil War organized at his own expense three regiments for the Union army. He was instrumental in promoting the centennial celebration of Independence Day, Bunker Hill Day, Yorktown (Va.) Day, and of the inauguration of American constitutional government, and at the time of his death was organizing an international celebration of the birth of Christ to be held in Jerusalem in 1900. He died in Haddonfield, N. J., April 28, 1897. He was popularly known as "the father of celebrations."

Peyton, John Lewis, an American lawyer and author; born in Staunton, Va., Sept. 15, 1824; studied law at the Univer-

sity of Virginia, and subsequently practised in Chicago; in 1861 went to Europe as agent of the Confederacy, and remained abroad till 1880. He published "Adventures of My Grandfather" (1867); "The American Crisis" (1867); "Over the Alleghanies" (1869); "Memorials of Nature and Art" (1881). He died in 1896.

Pézenas, a town of France, on the left bank of the river Hérault; 32 miles S. W. of Montpellier. The vicinity produces excellent wine, and woolen and linen goods are manufactured. Pézenas is one of the principal brandy markets of Europe. Here Molière wrote "The Absurd Précieuses."

Pezza, Michele, See FRA DIAVOLO.

Pfäfers, hot springs in the canton of St. Gall, Switzerland, in the deep and gloomy gorge of the Tamina torrent, which joins the Rhine at Ragatz, 2½ miles to the N. They were discovered toward the middle of the 11th century, and have been used ever since. Patients used formerly to be let down by ropes, but they can now approach by a good road. The water (97° F.) is conducted in pipes to Ragatz, though there are bath houses (1704) in the ravine. Near the village of Pfäfers, which stands above and outside the ravine, is a Benedictine abbey, founded in the 8th century, but converted into a lunatic asylum after its dissolution in 1838.

Pfau, Ludwig (pfou), a German poet and critic; born in Heilbronn, Aug. 25, 1821. He took a prominent part in the Baden revolution of 1848; and was editor of the "Owl-Glass," one of the most spirited comic journals of that day. He wrote: "Voices of the Time" (1848); "German Sonnets for the Year 1850" (1849); translated into German "Breton Folk-Songs" (1859). Among his works in art criticism are: "Art in the State" (3d ed. 1888), "Contemporary Art in Belgium"; "Art and Criticism" (1877). He died in Stuttgart, April 12, 1894.

Pfeffel, Gottlieb Konrad (pfä'fel), a German poet; born in Colmar, June 28, 1736. He became totally blind in 1758. He is best known as a fabulist. He wrote "Ibrahim"; "The Tobacco Pipe"; "Theatrical Diversions after French Models" (1765); "Dramatic Plays for Children" (1769). A selection from his "Fables and Poetical Narratives" was published in 1810. He died in Colmar, May 1, 1809.

Pfeiffer, Ida, an Austrian traveler; born in Vienna, Oct. 15, 1797. In her youth she was educated by her father into masculine habits and hardiness; and on the death of her husband, Dr. Pfeiffer, an advocate, she determined to gratify her love of traveling. Accordingly, she visited Turkey, Palestine, and Egypt (1842); Scandinavia and Iceland (1845); journeyed round the world

in 1846-1848, visiting China, India, Persia, Greece, etc.; visited California, Peru, Oregon, etc., in 1852; and in 1856 explored Madagascar. The narratives of her various journeys have been translated into English. She died in Vienna, Oct. 28, 1858.

Pfennig, or Pfenning, a small copper coin of various values, current in Germany and the neighboring States. The *pfennig* of the German empire is the hundredth part of the mark.

Pfizer, Gustav (pfē'tser), a German poet; born in Stuttgart, July 29, 1807. His principal works are: "Poems" (1831; a second series 1835); "Life of Martin Luther" (1836); "Poems Epical and Epico-Lyrical" (1840); the poem "The Italian and the German: Æneas Silvius Piccolomini and Gregor von Heimburg" (1844); "History of Alexander the Great" (1847). He died in Stuttgart, July 19, 1890.

Pfleiderer, Otto, a German theologian; born in Stetten, Württemberg, Sept. 1, 1839; studied under Baur, at Tübingen, from 1857 till 1861, and next paid a visit of study to England and Scotland; became pastor at Heilbronn in 1868, and superintendent at Jena in 1870, an office which in the same year he exchanged for the chair of Theology there. In 1875 he was called to be Professor of Systematic Theology at Berlin. In New Testament criticism Pfeleiderer belonged to the younger critical school which grew out of the impulse given by Baur. But he was not the less an independent thinker, acute, suggestive, and profoundly learned, and he made his name as well known in England and America as in Germany by a series of works which no serious student of philosophy or theology can afford to overlook. Of these the chief are "Religion, its Essence and History" (1869; 2d ed. 1878); "Paulinism" (1873 Eng. trans. 1877); "Philosophy of Religion" (1878 Eng. trans. 1886-1888); "Outline of Christian Faith and Ethics" (1880; 4th ed. 1888); "The Development of Theology since Kant" (1890); "The Philosophy and Development of Religion," etc. He died July 20, 1908.

His brother, EDMUND PFLEIDERER, born in Stettin Oct. 12, 1842, studied at Tübingen, and after a short experience as a pastor was made Professor of Philosophy at Kiel in 1873, whence he was called to Tübingen in 1878. His writings include studies on Leibnitz (1870), on Empiricism and Scepticism in Hume's Philosophy (1874), modern Pessimism (1875), Kantian criticism and English philosophy (1881), Arnold Geulinx (1884), Lotze (2d ed. 1884), Heraclitus of Ephesus (1886), etc.

Pforzheim, the chief manufacturing town of Baden; at the N. border of the Black Forest, 20 miles S. E. of Carlsruhe. It contains the remains of an ancient castle,

Phacochoerus

from 1300 to 1565 the residence of the Margraves of Baden-Durlach, and was the birthplace of Reuchlin. The town is famous for the manufacture of gold and silver ornaments, in which 8,000 people are employed, and has further chemical and iron works, machine-shops, tanneries, paper and other factories. There is a trade in timber, cattle, ornaments, etc. The town was burned by the French in 1689. Pop. (1906) 59,307.

Phacochoerus, wart hog; a genus of *Suidæ*, distinguished by a fleshy wart under each eye, large, sharp, recurved canines, and the peculiar formation of the last molars. There are only two species: *P. ælianus* (Ælian's wart hog) from the N., and *P. æthiopicus* (the Ethiopian wart hog) from the S. of Africa. Their food consists principally of roots.

Phacops, a genus of fossil trilobites. *P. latifrons* is characteristic of the Devonian formation, and is all but world-wide in its distribution.

Phæcia. See CORFU.

Phædon, a Greek philosopher of Elis, who flourished about 400 B. C., was originally a slave, but obtained his freedom by the interest of Socrates, whose disciple he became, and remained with him till his death. After this he settled at his native place, where he founded a school of philosophy.

Phæda, in Greek legend, a daughter of Minos and Pasiphæ, and the wife of Theseus. Having formed an illicit love for her husband's friend Hippolytus, who rejected her addresses, she on the death of her lover confessed her guilty affection, and in despair terminated her life by hanging.

Phædrus, a Latin writer of the Augustan age, who translated and imitated the fables of Æsop. He was a slave brought from Thracia or Macedonia to Rome, and manumitted by Augustus. Some authorities have doubted the genuineness of the fables ascribed to Phædrus, but their style is favorable to the supposition of their genuineness. There are five books containing 97 fables attributed to him, besides certain others.

Phaeton, in Greek mythology, according to Ovid, a son of the sun, or Phœbus. Venus became enamored of him, and entrusted him with the care of one of her temples. This favor of the goddess rendered him vain, and led to his asking his father's permission to drive his chariot one day. Phœbus represented the dangers to which this would expose him; but in vain. He undertook the aerial journey; and the explicit directions of his father were forgotten. No sooner had Phaëton received the reins than he betrayed his ignorance of guiding the chariot. The flying horses became sensible of the confusion of their driv-

Phalanger

er, and immediately departed from the usual track. Phaëton repented too late of his rashness; and already heaven and earth were threatened with a universal conflagration, when Jupiter, who had perceived the



PHAETON.

disorder of the horses, struck the rider with a thunderbolt, and hurled him headlong from heaven into the river Po. His body, consumed with fire, was found by the nymphs of the place. There was a drama by Euripides on Phaëton. Also an open carriage like a chaise, on four wheels, and drawn by two horses.

Phagedena, or **Phagedæna**, a spreading obstinate ulcer; an ulcer which eats and corrodes the neighboring parts.

Phagocytes, microscopic masses of protoplasm capable of ameboid movements, occurring in the blood and lymph, and in the bone marrow and other connective tissue of the body, where they absorb and assimilate bacteria and microbes appearing therein.

Phalanstery. See FOURIERISM.

Phalanger, in zoölogy, the popular English name for any individual of the subfamily *Phalangistinae*. Phalangers are



PHALANGER.

small woolly-coated marsupials, with opposable great toes, which are destitute of a nail. They are, for the most part, vege-

Phalanx

table feeders, though some are insectivorous, and in confinement any of them will readily devour small birds or other animals. They may be grouped in two classes, those with, and those without, a patagium or flying membrane.

Phalanx, in Greek antiquities, the close order of battle in which the heavy-armed troops of a Grecian army were usually drawn up. There were several different arrangements of the phalanx peculiar to different states; but the most celebrated was that invented by Philip of Macedon. In anatomy, phalanges or phalanxes are the small bones of the fingers and toes, so called from their regular disposition. Normally each digit has three phalanxes. Called also internodes.

Phalaris, a tyrant of Agrigentum, in Sicily, who flourished about the middle of the 6th century B. C.; born on a small island near Cnidus, in Asia Minor, and while building a temple in the citadel of Agrigentum made himself master of the city. He greatly embellished it, and extended his power over large districts in Sicily. But after holding power for 16 years he was overthrown, for his cruelties, by noble families of the island, and roasted alive in his own invention, the brazen bull.

Phalaris, a small genus of grasses, of which the seed of one of the species, *P. carariensis*, or canary grass, is extensively employed as food for birds, and commonly known as canary seed.

Phalarope, the popular name of any individual of the genus *Phalaropus*, extending throughout Northern Europe and Northern Asia. The red or red-necked phalarope (*P. hyperboreus*), about the size of a sandpiper, has the upper parts blackish-gray, the feathers edged with red, sides of the neck chestnut; thorax, breast, and belly white. The gray phalarope (*P. fulicarius*) is so called from the prevailing hue of its winter plumage; in summer the upper parts exhibit a mixture of black, white, and yellow; breast and under parts reddish chestnut. It is rather larger than the first species. Wilson's phalarope (*P. wilsonii*) is a North American bird; the lobes of the toes have a narrower border, and the legs are longer and slenderer than in the other species. They feed on minute crustacea, and their flesh is oily and unpalatable.

Phallism, the worship of the fertilizing power of nature under the symbol of the phallus. The idea that natural productions were engendered in a manner akin to the propagation of man and the lower animals is poetically expressed by Vergil and Lucretius. Phallism appears to have been at first an independent cult, but was after-

Pharaoh's Serpents

ward adopted into other forms of worship, or it may have been the germ whence other forms sprang. Its origin is unknown. The Phœnicians ascribed its introduction into their worship to Adonis; the Egyptians to Osiris, the Phrygians to Atys, and the Greeks to Dionysos, but such a belief may well have arisen in many places in the infancy of the human race. See ASHTAROTH: BAAL.

Phallus, a name of Priapus.

Phallus, plural **Phalli**, in comparative religion, the representation of the male organ of generation as a symbol of the fertilizing power in nature. According to Westropp, three phases in its representation should be noted: (1) when it was the object of reverence and religious worship; (2) when it was used as a protection against malign influences, and especially against the evil eye; and (3) when it became the emblem of mere licentiousness.

Phanerogamia, a primary division of the vegetable kingdom, containing all flowering plants; opposed to Cryptogamia.

Phantasiasts, a division of the Monophysite sect in the 6th century, who followed Julian of Halicarnassus in believing that the Divine nature had so insinuated itself into the body of Christ from the very moment of His conception that it became incorruptible. Nor did it feel real hunger, thirst, fatigue, or pain, but only semblances. Called also Aphthartodocetæ, Docetæ, and Manichæans.

Phantasmagoria, an optical effect produced by a magic lantern. The glass is painted black on all parts except that occupied by the figures, which are painted in transparent colors. The image is thrown on a transparent screen placed between the spectators and the lantern. By moving the instrument toward or from the screen, the figures are made to diminish or increase in size, which is capable (*e. g.*, if the figure be a skeleton) of producing startling effects. Also, the apparatus by which such effect is produced.

Pharaoh, the name borne in the Bible by 10 kings of Egypt; the best known of which are, the monarch to whom Joseph explained his dream, and who loaded him with honors; he who commenced the persecution of the Hebrews, and who put to death all the male children; and he who was summoned by Moses to permit of the departure of the Hebrew people, and who was afterward drowned, with all his host, in the waters of the Red Sea.

Pharaoh's Serpents, a dangerous chemical toy, composed of sulpho-cyanide of mercury.

Pharisees

Pharisees, the most numerous of the three divisions or orders of Judaism in the time of Christ, the other two being the Essenes and the Sadducees. They were so called because they kept aloof from Levitically impure food, separated themselves from the lawless people of the land, and united to keep the Mosaic law in accordance with Ezra vi: 21, ix: 1, x: 11; Neh. ix: 2, x: 28. They arose after the return from the Babylonish captivity and represented the national faith of orthodox Judaism.

Pharmacopœia, a book containing the prescriptions for the preparation of medicines recognized by the general body of practitioners. Up till 1863 separate pharmacopœias were issued by the Colleges of Physicians of London, Edinburgh, and Dublin. Since then a British pharmacopœia, issued by the medical council of the kingdom, is recognized by the whole medical profession of Great Britain. There is also an American pharmacopœia.

Pharmacy, or Pharmaceutics, the art of preparing, compounding, and combining substances for medical purposes; the art of the apothecary. As these substances may be mineral, vegetable, or animal, theoretical pharmacy requires a knowledge of botany, zoölogy, and mineralogy; and as it is necessary to determine their properties, and the laws of their composition and decomposition, of chemistry also. In a narrower sense pharmacy is merely the art of compounding and mixing drugs according to the prescription of the physician. In pharmaceutical operations the apothecaries' weight is used, in which 20 grains make a scruple, 3 scruples a drachm, 8 drachms an ounce, and 12 ounces a pound; in fluid measure 60 minims (drops) make 1 fluid drachm, and 8 drachms a fluid ounce.

Pharnaces, a King of Pontus; the son of Pontus, the son of Mithridates V., and grandfather of Mithridates the Great. He made war against the King of Pergamus, and reigned between 190–157 B. C.

Pharnaces, King of the Cimmerian Bosphorus; son of Mithridates VI., King of Pontus, and revolted with the army against his father, who slew himself in despair, 63 B. C. Pharnaces cultivated the friendship of the Romans, and in the war between Cæsar and Pompey, he remained neutral; but Cæsar declared war against and defeated him 47 B. C., after a struggle of three days only. It was on that occasion that Cæsar wrote to the Roman senate, in allusion to his easy triumph: "I came, saw, and conquered" (*Veni, vidi, vici*). Pharnaces died shortly afterward.

Pharos, a lighthouse. The name is derived from the island of Pharos, close to

Phascolumys

and now part of Alexandria, which protected the port of that city. On the E. promontory of the island stood the lighthouse of Alexandria, so famous in antiquity, and considered one of the wonders of the world, built 300 years B. C.

Pharsalus, now FERSALA, a town of Thessaly, to the S. of Larissa, on a branch of the Salambria, and accordingly in the part of Thessaly restored to Greece in 1881. The district, Pharsalia, is historically notable mainly for Cæsar's great victory over Pompey, Aug. 9, 48 B. C.

Pharyngobranchii, an order (Huxley) or sub-order (Owen) of fishes, coextensive with Müller's sub-class Leptocardii. It contains one family, *Cirrostromi*, with a single genus, *Branchiostoma* (for this name, being two years older, should replace *Amphioxus*).

Pharyngognathi, an order of fishes established by Müller. Part of the rays of the dorsal, anal, and ventral fins are non-articulated spines; the lower pharyngeals coalesced; air bladder without pneumatic duct. As at present restricted it contains four families: *Pomacentridæ*, *Labridæ*, *Embiotocidæ*, and *Chromides*.

Pharynx, the dilated commencement of the gullet. There may be a diffused erysipelatous inflammation, an ordinary or a syphilitic ulcer of the pharynx, or foreign bodies may become imbedded in it.

Phasania Regio. See FEZZAN.

Phascogalé, a genus of marsupial quadrupeds allied to the Dasyures, and containing, according to the most reliable estimate, 13 species, all of which are arboreal and insectivorous; they are spread through the Papuan islands and Australia. The best-known form is perhaps the "Tapoa Tafa" (*P. penicillata*), of the size and appearance of a rat, which commits depredations in the larders of Australian colonists, and is of the fiercest disposition when meddled with. This marsupial has a curious resemblance to the rodent genus *Hapalotis*, also found in Australia. It may be a case of "mimicry" between some of the species.

Phascolumys, wombat, the sole genus of the family *Phascologyidæ*. Tail rudimentary; stomach simple; cæcum very short, wide, and with a peculiar vermiform appendage. Three species are known; they may be divided into two groups: (1) *P. wombat* and *P. platyrhinus*, the common and broad-nosed wombats; and (2) *P. latifrons*, the hairy-nosed wombat. They are terrestrial, burrowing animals, vegetable feeders, from the S. of Australia, Tasmania, and the islands of Bass' Straits. An extinct species, as large as a tapir, has been found in the Australian Pliocene deposits.

Phase, or **Phasis**, in astronomy, one of the gradual changes undergone by the moon in passing from an unilluminated state (new moon) through that of a continually broadening crescent to a complete orb (full moon), and back to new moon again. Similar phases are undergone by the inferior planets, Mercury and Venus, though, owing to their small size and the excessive brightness of the latter planet under the telescope, the phenomenon is not so easily seen. Mars, though a superior planet, has slight phases; when in opposition his disk is circular, at all other times it is gibbous. So also have Saturn's rings. In mineralogy, transparent green quartz. In physics, any one point or portion in a recurring series of changes, especially when contrasted with another point, as, the phases in the waves of vibration, in the tides, in the motion of a pendulum, etc. In physiology, the several changes which the human and other organisms undergo in the progress from birth to maturity, and thence again to decline and death.

Phaseolus, the typical genus of the *Phaseoleæ*. Herbaceous or suffrutescent plants, with pinnately trifoliate leaves; the leaflets with partial stipules; axillary flowers, with their keel spirally twisted and cylindrical; many-seeded legumes, with partitions. *P. vulgaris* is the kidney-bean; *P. multiflorus*, the scarlet runner. The former, *P. mungo*, with the varieties *radiatus*, *P. calcaratus*, *P. aconitifolius*, *P. lunatus*, and *P. trilobus*, are cultivated in India for food or fodder. The leaves of the last are considered by Indian doctors to be cooling, sedative, antibilious, and tonic, and useful for sore eyes. The roots of *P. radiatus* and *P. multiflorus* are narcotic. Those of *P. mungo*, variety *radiatus*, are used in India in paralysis, rheumatism, fever, etc.

Phasis, in ancient geography, a river in Colchis, now called Rion or Faz. It rises in the Caucasus, and flows W. into the Euxine near the ancient city of Phasis.

Phasmidæ, stick and leaf insects; a family of cursorial Orthoptera. Antennæ, thread-like; ocelli, three or none; legs all of equal length, the first not prehensile, thus distinguishing them from the allied *Mantidæ*; aspect like that of a brown or of a green and withered twig, this disguise affording them protection from their foes. Habitat, the warmer countries, especially those of the Eastern Hemisphere. A few are from temperate regions. Two are from the S. of Europe, the best known being *Bacillus rossi* (Rossi's stick-insect), two to two and a half inches long, from Italy and the S. of France. Two, *Acrophylla titan*, from Australia, and *Bacteria aurita*, from Brazil, each 10 inches long, are the largest known insects. In some the wings and

elytra perfectly resemble leaves, others are apterous.

Pheasant, *Phasianus colchicus*, and, more widely, any bird of the sub-family *Phasianinæ*. The common European pheasant probably had its original home in the East. Martial says that it was brought from Colchis in the Argo. It was esteemed by epicures, but was then only within reach of the wealthy. It is one of the most highly prized game birds. The adult male pheasant is a beautiful bird, about three feet long. Head and neck deep steel-blue, shot with greenish-purple and brown; eye surrounded by a patch of scarlet skin, speckled with blue-black; ear-coverts brown; back a light golden-red, the feathers of the upper part tipped with velvet-black, of the lower part marked with brown. Quill feathers brown, of various shades tail feathers oaken-brown, barred with a darker shade and with black. Breast and front of the abdomen golden-red with



PEACOCK PHEASANT.

purple reflections, feathers edged with black; rest of abdomen and under tail-coverts blackish-brown. The female has yellowish-brown plumage, and is about two feet in length. Other species are *P. shawi*, *P. insignis*, *P. mongolicus*, *P. torquatus*, *P. formosanus*, *P. decollatus*, *P. versicolor*, *P. elegans*, *P. wallichi*, *P. reevesi*, and *P. sœmmeringi*, known respectively as Shaws, the Yarkand, the Mongolian, the ring-necked, the Formosan, the ringless Chinese, the Japanese, the green-backed golden, Wallich's, Reeves', and Sœmmering's pheasant. *Thaumalea picta* is the golden and *T. amherstiae* Lady Amherst's pheasant. The silver pheasant is *Euplocomus nycthemerus*.

Pheasant Shell, *Phasianella*, a genus of gasteropodous mollusca, found in South America, India, Australia, the Mediterranean, etc. The shell is spiral and obovate, the outside polished and richly colored.

Phelps, Austin, an American clergyman and author; born in West Brookfield, Mass., Jan. 7, 1820. He was pastor of the Pine

Phelps

Street Congregational Church, Boston, in 1842-1848; and Professor of Sacred Rhetoric in Andover Theological Seminary, in 1848-1879. He was noted as an original writer and an eloquent preacher. His works include: "The Still Hour" (1859); "The New Birth" (1867); "Men and Books" (1882); "English Style in Public Discourse" (1883). He died in Bar Harbor, Me., Oct. 13, 1890.

Phelps, Edward John, an American diplomatist; born in Middlebury, Vt., July 11, 1822; was graduated at Middlebury College in 1840; studied at the Yale Law School; was admitted to the bar in 1843; and settled in Burlington in 1845. In 1851 he was appointed Comptroller of the Treasury and remained in the office through Fillmore's administration. In 1881-1885 he was Professor of Law in the Yale Law School and also lecturer on constitutional law in Boston University. He was minister to England in 1885-1889. During the Bering Sea dispute he was senior counsel for the United States. He died in New Haven, Conn., March 9, 1900.

Phelps, Elizabeth Stuart. See WARD, ELIZABETH STUART (PHELPS).

Phelps, Samuel, an English actor; born in Devonport, England, Feb. 13, 1806. He was apprenticed to a printer, but took to the stage in 1827, and 10 years later was appearing in London in leading Shakespearian characters, and was one of the leading performers under Macready at Covent Garden. From 1844 to 1862 he directed Sadler's Wells Theater. He was regarded as the most accomplished Shakespearian actor of his day, excelling more especially in comedy parts such as Bottom, Justice Shallow, etc. He published a scholarly edition of Shakespeare in 1853. He died in Epping, Essex, England, Nov. 6, 1878.

Phenacetin, a drug prepared from carbolic acid, valuable in fevers, and, like antipyrin, of service in stilling pain and securing rest in cases of severe headaches, insomnia, and nervousness.

Phenol, a name for CARBOLIC ACID (*q. v.*).

Phenomenon, Noumenon (plural, Phenomena, Noumena), words used by Kant to express object and subject. The Greek word *phainomai* means to appear, and phenomenon is what our senses cognize. Noumenon is from the Greek word *nous*, "pure intelligence"; and a noumenon is an object pure and unbodied, that is divested of everything cognizable by the senses.

Pherae, a powerful city of Thessaly, near Mount Pelion; according to legend, the ancient royal seat of Admetus and Alcestis, and afterward of political consequence un-

Phi Beta Kappa

der "tyrants" of its own, who long made their influence felt in the affairs of Greece, and repeatedly attempted to make themselves masters of Thessaly. One of these tyrants, Alexander (slain 357 B. C.), is particularly celebrated for his cruelties.

Pherecydes, an ancient Greek philosopher; born in the island of Syros, in the 6th century B. C., a contemporary of Thales. He taught the doctrine of the existence of the human soul after death; but it is uncertain if he held the doctrine of the transmigration of souls, afterward promulgated by his disciple, Pythagoras. Of his work, a mythological system of philosophy, only fragments are extant. Another Pherecydes, a native of Leros, who lived in the 5th century B. C., compiled mythical histories of Athens and other states, but only a few fragments remain.

Phi Beta Kappa, the oldest of the American college Greek-letter societies. It takes its name from the initial letter of



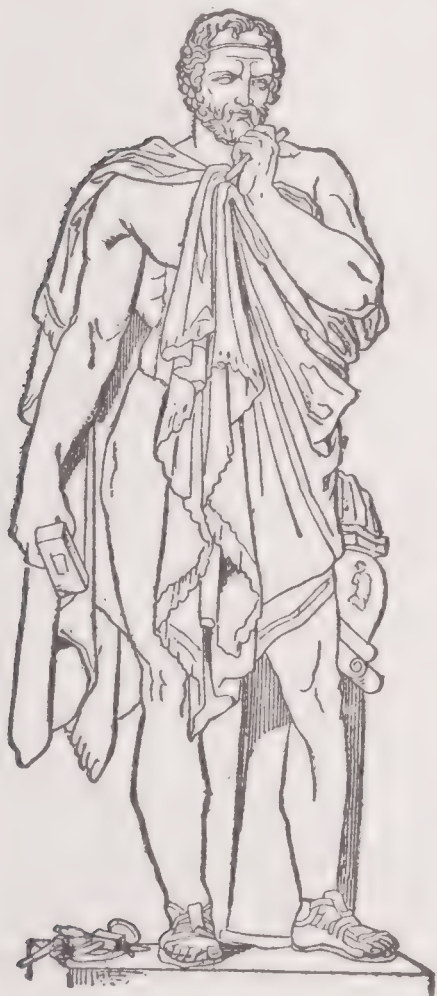
STATUE OF ATHENA, BY PHIDIAS.

its motto, said to be *Philosophia Biou Kubernetes*, "Philosophy is the guide of life." It was founded in 1776 in the old "Raleigh Tavern" at Williamsburgh, Va., by 44 undergraduates of William and Mary College, of whom John Marshall was one. Branches were established at Yale in 1780 and at Harvard in 1781; and today there are nearly a score in the principal colleges and universities of the Union. The Phi Beta Kappa is now simply "an agreeable bond of

Phidias

meeting among graduates"; since 1831 its innocent mysteries have been open secrets. At Harvard there is an annual Phi Beta Kappa dinner, oration, and poem; the earliest and one of the most striking of Edward Everett's great orations was delivered before the society, with Lafayette for a guest, in 1824; and among the poets may be mentioned R. T. Paine ("The Ruling Passion," which brought him \$1,200 on its publication in 1797) and Oliver Wendell Holmes (1829). In colleges where the first third of a graduating class are admitted to Phi Beta Kappa there is a burlesque of the society, the Kappa Beta Phi, for the consolation of the third at the other end of the class, generally in the order of demerit, the winner of the WOODEN SPOON (*q. v.*) ranking first.

Phidias, the great Greek sculptor; born in Athens, probably between 490-480 B. C. Little is certainly ascertained about the



PHIDIAS.

c i r c u m -stances of his life. He began to distinguish himself about 464, and was employed in public works at Athens under the administration of Cimon. He was one of the most intimate friends of Pericles, under whose rule he was appointed director of all the great temples and monuments which were to be erected in the city. Of these the most important were the Parthenon, or temple of Athena, on the

Acropolis, and the Propylæa. He executed a colossal statue of the goddess for the interior of the temple with his own hand. The well-known Elgin Marbles of the British Museum were the sculptured decorations of that unrivaled temple. Phidias spent some years at Olympia, and there he executed the most magnificent of all his works—the statue of the Olympian Zeus. Like the Athena, it was of ivory and gold, was nearly 60 feet in height, though a seated figure, and was deemed the greatest production of Greek art. It was destroyed by fire at Constan-

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tinople, whither it had been carried by the Emperor Theodosius. Phidias was charged with peculation, and when the charge broke down, he was charged with impiety on the ground of having introduced portraits of himself and Pericles on the shield of Athene. This attack was made on him as the friend of Pericles, whom his enemies sought to wound indirectly. The prevailing characteristic of the works of Phidias appears to have been an ideal sublimity of form which has never since been equaled. According to the generally received account, he was thrown into prison, and died there, 432 B. C.

Phigalia, an ancient town of Arcadia, situated in its extreme S. W. corner. From its temple of Apollo, at Bassæ, 5 to 6 miles distant, a sculptured frieze representing the contests between the Centaurs and Lapithæ, and the Amazons and Greeks, was brought to the British Museum in 1812. The temple was first described by Chandler in 1765. Next to the Theseum at Athens it is the most perfect architectural ruin in all Greece, being built of fine gray limestone and white marble. It was designed by Ictinus, one of the architects of the Parthenon at Athens, and measured originally 125½ feet long and 48 broad, and had 15 columns on each side and 6 at each end, in all 38, of which 34 still stand.

Philadelphia, the name of two ancient cities of Asia. The Philadelphia of Asia Minor was situated in Syria, 63 miles E. of Smyrna. It was founded about 200 B. C., by Altalus Philadelphus for whom it was named. Its site was nearly 1,000 feet above sea-level at the base of Mount Tmolus and was in one respect unfavorable, the region being subject to earthquake disturbances. The stadium, acropolis and theater were built on the brow of the hill above the city. From the large number of its temples, Philadelphia was sometimes called "Little Athens." That a body of Christian believers was early gathered at Philadelphia is evident from the message addressed to that church in the book of Revelation. The modern town of Ala-Shehr occupies the site of ancient Philadelphia. It belongs to the pashalic of Anatolia. In 1390 it was captured by the Turks after a long siege. The town contains five Christian churches and many mosques and has a considerable trade. The population is from 15,000 to 18,000.

The Syrian city of Philadelphia was situated in Palestine E. of the Jordan on the Jabbok (or Zerka) about 52 miles N. E. of Jerusalem. It was originally the most important city of the Ammonites and was known as Rabbath Ammon (modern Ammon). During the reign of David, his army under the leadership of Joab captured the city. Dr. Selah Merrill says:

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"The extensive ruins on the top of the hill to the N. no doubt occupy the site of the citadel or part of the great city which David took after Joab had taken the 'City of Waters,' i. e., that portion of the town which lay along the stream itself."

In the 3d century B. C. the city was rebuilt by Ptolemy Philadelphus and its name changed to Philadelphia. In 218 B. C. it was captured by Antiochus the Great, and afterward by Aretas, King of Arabia, and seems to have fallen into decay but revived and became one of the cities of the Decapolis.

Philadelphia, a city coextensive with Philadelphia co., Pa.; on the Delaware and Schuylkill rivers, and on the Pennsylvania, Philadelphia and Reading, and the Baltimore and Ohio railroads; 85 miles S. W. of New York. It is the largest city of Pennsylvania and the third largest in the United States; area, 132 square miles; pop. (1900) 1,293,697; (1910) 1,549,008.

Topography.—The city is built chiefly on a low peninsula between the two rivers. In the portion most thickly built up the highest elevation is 46 feet, but rises to 440 feet in the suburbs. It extends N. and S. about 22 miles, and is from 5 to 10 miles in width. There is a water frontage on the Delaware river of over 16 miles, of which more than 5 miles have docks. The harbor has been greatly improved by the removal of the islands in the middle of the river, and in front of the wharves there is an average depth of 50 feet. The Schuylkill river, which runs through the city, is navigable for large vessels to Walnut street, and is crossed by many bridges, of which the most costly are at Walnut street, Gray's Ferry, Spring Garden street, and Girard avenue. The section of the city W. of the Schuylkill is locally called West Philadelphia; another noted section is known as Germantown. League Island, containing a widely-noted navy yard, has an area of 925 acres.

Municipal Improvements.—The city owns a waterworks system which cost about \$35,000,000. The reservoirs have a storage capacity of 1,417,966,400 gallons, and the water is distributed through 1,338 miles of mains. There are in all 1,494 miles of streets, of which 1,067 are paved. The sewer system covers 844 miles. The city is lighted by electricity at a cost of \$929,667 per annum. The annual cost of the police department is \$2,951,242, and that of the fire department \$1,072,378. The annual death rate averages 19.38 per 1,000. The cost of maintaining the city government in 1900 was \$27,732,208. Street car lines (nearly all electric) traverse the principal streets and extend to the various suburbs. The sum of \$1,500,000 has been appropri-

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ated for the widening of Delaware avenue, and there is a large Girard estate fund that may be drawn upon for that purpose.

Modern Philadelphia.—Old Philadelphia is a passing city, and new Philadelphia an accomplished fact. New blood has wrought the change. For over a century the old-fashioned, white-shuttered houses about Independence and Washington squares had been the sarcophagi of mummified ideals of fame. Within the past 10 years a new generation has risen to power, and these tombs are giving place to new buildings, hives inviting industry. The men who existed in these houses are gone. Many of them amassed immense fortunes, not by the fostering of industries, but by quietly accumulating money from rent rolls, from safe foreign speculations, and from mild real estate ventures. The heirs, however, who now control these fortunes are not content to follow the methods of their fathers. They dare to make bolder ventures; they want to see their money work; they want to double in a decade what was accumulated in a half century.

Nowhere is the new order of things more markedly in evidence than in the vicinity of Broad and Chestnut streets. There "sky-scrapers" are building. The tallest at present is the nearly completed "North American" building, where that newspaper will have its home hereafter. This is the younger Wanamaker's enterprise. The elder Wanamaker's new building, which will stand where his store now is, extending from Chestnut to Market street, and from 13th street to Penn Square, will perhaps be the largest building ever erected by an individual. Plans are being made for it, and Mr. Wanamaker is said to have declared that he will spend \$5,000,000 on the building alone. The "North American" 20-story building represents an investment of one-tenth of that sum.

Penn Square is being surrounded by new tall buildings. Matching the great Wanamaker building which will tower over the S. E. corner of the square, will be the new Pennsylvania railroad office building on the S. W. corner. This building will be 13 stories high, and will be known as the Continental Trust Company building, that company to have a bank on the ground floor. A bridge over Market street will connect the new building with the Pennsylvania railroad's Broad street station.

Two new theaters to cost \$1,000,000 each are assured. They will be Keith's, on the old Baldwin mansion site, on Chestnut street, above 11th, and the Garrick, to be built by William Wrightman, on Sansom street, below Broad. This theater will have a Chestnut street entrance. Two hotels to cost \$1,000,000 each are also promised. John Stafford, an operative builder, will erect one of these on the S. E. corner of

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13th and Walnut streets. The other is to be built on the site of the old Epiphany Church, on the N. E. corner of Chestnut and 15th streets, by Anthony M. Zane, another operative builder, who bought the site from Mr. Wanamaker for \$1,000,000. Four years ago the great merchant paid \$600,000 for the place. Mr. Zane is said to be backed by Messrs. Widener and Elkins of the Land Title Trust Company, and these two millionaires have practically completed arrangements for the purchase of the Lafayette Hotel, on Broad and Sansom streets, proposing to tear it down and to extend the Land Title Trust office building, 17 stories high, over the site. Across Sansom street from the hotel is the Union League Club, facing Broad street. Next year the building will be torn down, and the largest club building in the world will take its place.

Fairmount Park.—This is one of the largest public parks in the world. It extends more than 7 miles on both banks of the Schuylkill river, and more than 6 miles on both banks of Wissahickon creek, giving it an area of over 3,000 acres, traversed by 32½ miles of driveways. The park contains four reservoirs of the Schuylkill waterworks; Randolph Rogers' colossal bronze statue of Abraham Lincoln; a statue of Washington; the mansion (now occupied by a restaurant) in which Robert Morris lived during the Revolutionary War; the Solitude, a villa erected by John Penn, grandson of William Penn, in 1785; the Zoölogical Gardens; Commercial Museum; Belmont Glen, a beautiful ravine; and other points of interest. In 1876 the Centennial Exposition was held here. Memorial Hall, erected at a cost of \$1,500,000, which was used for the art gallery of the Exposition, now contains a permanent industrial and art collection. Here also is the Horticultural Building filled with tropical and other plants and surrounded by 35 acres of ground devoted to horticulture.

Notable Buildings.—In the heart of the city, at the intersection of Market and Broad streets, stands the City Hall, on a piece of ground which was formerly Penn Square. This great structure, usually called the Public Buildings, is said to be the largest building in the United States. It was built of white marble and granite; is 486½ feet long by 470 wide; contains 520 rooms, and including a court yard 200 feet square in the center, covers an area of nearly 4½ acres. The central tower rises to a height of 547 feet, 3 inches, and is surrounded by a colossal statue of William Penn, 37 feet in height. The total cost of the building was over \$20,000,000. Besides this there are many other great buildings including the Masonic Temple, costing \$2,000,000; the old and new United States mints; the postoffice, costing nearly \$8,000,-

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000; the new Bourse, costing \$2,000,000; Independence Hall, famous as the State House of the colonial period; the Pennsylvania Hospital, covering an entire square; the building of the Historical Society of Pennsylvania; the Philadelphia Library, containing upward of 200,000 volumes; Academy of Fine Arts, containing one of the most extensive collections of paintings, engravings, bronzes, and sculptures in the United States; Odd Fellows' Hall; the Armory of the State Fencibles; custom house, copied from the Parthenon, and considered one of the best samples of Doric architecture in the world; the stations of the Pennsylvania and the Philadelphia and Reading railroads; etc.

Manufactures.—In its manufacturing products Philadelphia ranks next to New York. There are upward of 20,000 manufacturing establishments, with a combined capital of about \$400,000,000, and nearly 300,000 employes. The combined output amounts to more than \$600,000,000. The chief products are locomotives, sugar and molasses, men's clothing, foundry and machine shop products, carpets and rugs, hosiery and knit goods, woolen and cotton goods, malt liquors, morocco, chemicals, packed meat, refined petroleum and silk, and silk goods. The great Cramp ship-building yards are on the Delaware, just W. of the heart of the city.

Commerce.—In the fiscal year ending June 30, 1901, the imports of merchandise aggregated in value \$48,043,443, and the exports, \$79,354,025.

Banks.—On Sept. 1, 1900, there were 36 National banks in operation, having a combined capital of \$19,305,000; surplus, \$16,650,000; gross earnings, \$4,101,549; and net earnings, \$1,897,851. The exchange at the United States clearing house, in the year ending Sept. 30, 1900, aggregated \$4,679,455,332, an increase over the previous year of \$104,155,960.

Education.—At the close of the school year 1898-1899, the children of school age aggregated 250,630; the enrollment in the public day schools was 179,156, and in the private and parochial schools (estimated) 78,210; and the average daily attendance in public day schools was 128,258. There were 3,317 teachers; 325 buildings used for school purposes; and public school property valued at \$12,087,516. The receipts and expenditures of the year were \$4,902,158. The institutions for higher education include the William Penn Charter School, founded in 1689; the UNIVERSITY OF PENNSYLVANIA (*q. v.*); the Jefferson Medical College; the Woman's Medical College; the Hahnemann Medical College; the Philadelphia Polyclinic and College for Graduates; and the Medico-Chirurgical College. There are three colleges of dentis-

Philadelphia

try, one of pharmacy and one of veterinary surgery. There are also GIRARD COLLEGE (*q. v.*) founded in 1831 by Stephen Girard for poor white orphan boys and the Drexel Institute. (See DREXEL, ANTHONY).

Churches and Institutions.—There are more than 600 churches in Philadelphia, representing all the larger denominations and hundreds of charitable institutions. The most important hospitals are the State, the Insane, the Pennsylvania, the Orthopædic, Municipal, Woman's, Children's, Wills', Jewish, Episcopal, German, Presbyterian, Homeopathic, St. Mary's, and St. Joseph's. There are also many orphanages, homes for the aged, and other institutions of similar character.

Finances.—On Jan. 1, 1901, the total debt of the city was \$56,503,333; sinking funds, \$12,268,050; net debt, \$44,235,283. The city owned real estate valued at \$58,413,394. The assessed property valuation for 1900 was \$894,628,974; tax rate, \$18.50 per \$1,000. The borrowing capacity of the city by the decision of the Supreme Court on May 15, 1899, was \$11,200,000. On July 1, 1899, one-half of the bonds were issued, and on July 1, 1900, \$2,800,000 more.

History.—In September, 1681, a small party of settlers, sent out by William Penn, arrived at the site of the present city, and in the following summer the place was laid out and named Philadelphia, the "city of brotherly love." Penn himself reached New Castle on the Delaware, with a large number of Quakers, on Oct. 27, 1682. He was well received by a small party of Swedes who lived in a part of the present city. Shortly after his arrival he made the first treaty with the Indians at Shackamaxon. In 1683-1684, and for sometime afterward the immigration from England and Wales, Germany and Holland was considerable. Philadelphia was incorporated in 1691, but its charter was not received till 1701. The city was active in resisting British aggression in 1763-1764. On Sept. 5, 1774, the 1st Continental Congress met here, and on May 10, 1775, the 2d. Col. George Washington was appointed General and Commander-in-Chief of the American army in the State House on June 15, 1775. Here also the Declaration of Independence was adopted July 4, and proclaimed July 8, 1776. The city was occupied by the British from September, 1777, to June, 1778. A battle was fought at Germantown on Oct. 4, 1777. In the summer of 1787 delegates from the various States met in the State House, and framed the Constitution.

Philadelphia, The, a steel, twin-screw protected cruiser of the United States navy; 4,324 tons displacement; length, 327 feet, 6 inches; breadth, 48 feet, 6 inches; mean draft, 19 feet, 3 inches; horse power,

Philemon

8,815; main battery, 12 6-inch breech-loading rifles; secondary battery four 6-pounder rapid-fire guns, four 2-pounder rapid-fire cannons, three 37-millimeter Hotchkiss revolving cannons, and four Gatlings; speed 19.6 knots an hour; crew, 34 officers and 350 men; cost \$1,424,864.85.

Philadelphians, a mystic sect emphasizing "brotherly love" (Greek *philadelphia*), founded in London in 1652 under the influence of Boehme by Dr. John Pordage (1608-1698) and Mrs. Leade and others. It had for a time a branch in Holland, but disappeared early in the 18th century.

Philæ, an island in the Nile, near Asuan and S. of Syene, in Nubia. It is a small granite rock, fringed with rich verdure, about 1,200 feet long and 450 broad, almost covered with ancient buildings of great architectural beauty and interest, though not of very ancient date. That to the E., a hypæthral or roofless hall, commonly called "Pharaoh's bed," belongs to the Greek and Roman period, and consists of 14 great columns with capitals of various patterns, connected at the lower part by solid walls; the length is 63 feet, the width 48. The great temple of Isis, to whom the island was sacred, was mainly built by Ptolemy Epiphanes, and continued by his successors, especially by Ptolemy III., Euergetes. The processions of pilgrims approached the island from the S., were received by the priests at a flight of steps at the S. W. corner, and then passed into a court with a colonnade to right and left, erected by Tiberius and later Roman emperors. To the N. stood the great propylon or gateway, 60 feet high and over 120 wide. This is the oldest part of the temple, and bears the name of Nectanebes II. (about 361 B. C.). Beyond was another court with several chambers and a small chapel. Another smaller pylon gave entrance to the temple proper, at the N. extremity of the irregular complex of buildings. The temple proper contains representations of the story of Osiris, his birth, bringing up, death, and embalmment by Isis. It was converted into a Christian church in 577.

Philander Smith College, a coeducational institution in Little Rock, Ark.; founded in 1876 under the auspices of the Methodist Episcopal Church; has grounds and buildings valued at over \$50,000; scientific apparatus, etc., \$5,000; volumes in the library, 4,000; ordinary income, about \$10,000; average number of faculty, 25; average student attendance, 575; graduates, over 275.

Philemon, a member of the Colossian church (Col. ii: 7; iv: 9, 11, 14, Phil. 2, 10, 23, 24). The Epistle of Paul to Philemon: An epistle of Paul, in conjunction with Timothy (i: 1), to Philemon, whose runaway slave, Onesimus, had come to Rome, and been converted by the apostles

Philemon and Baucis

while the latter was a prisoner (i: 10), and advanced in years (9). Onesimus was most useful to his spiritual father (13), who, however, would not retain him, unless with his master's permission (14). He, therefore, sent him back, carrying the epistle with him, and counseling Philemon to receive him back, not now in a servile capacity, but as a brother beloved (16). Anticipating his speedy release, he also requested Philemon to prepare him a lodging (22). The epistle seems to have been written in A. D. 63 or 64, and to have been sent with the Epistle to the Colossians. Its genuineness is generally admitted.

Philemon and Baucis, in classic mythology, a married pair, remarkable for their mutual love. Jupiter and Mercury, wandering through Phrygia in human form, were refused hospitality by every one, till this aged pair took them in, washed their feet, and gave them such humble fare as they could provide. On going away, the gods took them with them to a neighboring mountain, on looking from which they saw their village covered with a flood, but their own cottage changed into a splendid temple. Jupiter permitted them to make any request they chose, but they only asked to be servants of his temple, and that they might die at the same time. When, accordingly, they were seated at the door of the temple, being now of great age, they were changed, Philemon into an oak, and Baucis into a linden.

Philetas of Cos, a Greek poet and critic; flourished between 350 and 290 B. C. He wrote elegies, epigrams, and prose grammatical works. He was preceptor to Ptolemy Philadelphus, and a favorite model of Theocritus. Fragments of his poems are extant.

Philharmonic Society, a musical organization established in London, in 1813, welcomed Mendelssohn to England in 1829 and again in 1844. The New Philharmonic was founded in 1852. The Philharmonic Society of New York dates from 1842.

Philidor, François André Danican, a French composer and chess player; born in 1726. In early youth he was chorister in the chapel of Louis XV., and afterward supported himself as a teacher and copier of music. He traveled in Holland, Germany, England, etc., and in 1753, when in England, he set Dryden's "Ode for St. Cecilia's Day" to music. He had while here devoted his attention principally to chess; and he gained extended fame from having published his analysis of the game, which is still referred to as an authority. On his return to France, in 1754, he produced about 20 operas at the Opéra Comique. He went to London in 1779, where he produced the music to Horace's "Carmen Seculare," his best work. Having been pensioned for

Philip

his services he abandoned musical composition in 1788 in order to give himself up entirely to chess. He died in 1795.

Philip, one of the 12 apostles, according to John's Gospel, "of Bethsaida, the city of Andrew and Peter," and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but is not again mentioned. In the Western Church he is commemorated May 1. **PHILIP THE EVANGELIST**, often confounded with the above, is first mentioned in Acts vi: 5. He preached at Smyrna, where Simon Magus was one of his converts; baptized the Ethiopian eunuch; and entertained Paul and his companion on their way to Jerusalem.

Philip, the name of various European rulers, as follows:

MACEDON.

The name of five kings, the most celebrated of whom was **PHILIP II.**, father of Alexander the Great, and son of Amyntas II.; born 359 B. C. He was brought up at Thebes, and educated by Epaminondas, and began to reign after the death of his brother, Perdiccas III., in 359. With great ability, energy, and success, he first secured the internal peace and order of his kingdom, improved the discipline of his army, and created the famous phalanx, which contributed to so many Macedonian victories. He cherished vast schemes of conquest; aspired first to make himself master of all the states of Greece, and then to invade and conquer Persia. The siege and capture of Amphipolis, Pydna, and Potidæa took place between 358-356. Four years later, after taking Methone, and subduing Lycophron, tyrant of Phæræ, he advanced toward Greece, but his course was stayed at Thermopylæ by the Athenians. The same year Demosthenes delivered the first of his famous orations ("Philippics") against the Macedonian conqueror. Philip took Olynthus in 347, after a war of three years; soon after made peace with the Athenians, conquered Phocis, and closed the Sacred War, and was admitted into the Amphictyonic Council. In 340 he besieged Perinthus and Byzantium, but the Athenians, aroused by the successive appeals of their great orator, and alarmed by facts, sent an expedition under Phocion, and Philip had to raise the sieges in the following year. But the crisis of Greek independence was at hand; the victory of Chæronea, over the allied Athenians and Thebans, 338, made Philip master of Greece. He soon after assembled a congress at Corinth, and was named general of the Confederate Greeks in the war to be undertaken against Persia. But in 336 he was assassinated at Ægea, and that war was reserved for his son.

ROME.

PHILIP, born in Arabia about 204, and having entered into the military service of

Philip

the Romans, became prætorian prefect 243. The emperor Gordian was compelled to receive him as a colleague on the throne by the army which had conquered Sapor, King of Persia; and in the following year, 244, Philip assumed the whole authority by putting his rival to death. He was killed in battle by the soldiers of Decius in 249.

GERMANY.

PHILIP, the second son of Frederick Barbarossa; born in 1178, became king of Suabia and Tuscany after the death of his father, 1190, and emperor after the death of his brother, Henry IV., 1198. He was assassinated in 1208, and succeeded by Otho IV.

FRANCE.

PHILIP I., son of Henry I. and Anne of Russia; born in 1052, and succeeded to the throne under the guardianship of Baldwin V., count of Flanders, 1060; died, after a troubled reign, mixed up with the affairs of William the Conqueror, in 1108.

PHILIP II., surnamed Augustus, son of Louis VII. and of Alix, daughter of Thibault, Count of Champagne; born in 1165,



PHILIP II., OF FRANCE.

succeeded his father 1180, accompanied Richard Cœur de Lion to the Holy Land, 1190, invaded Normandy during Richard's captivity, 1193, confiscated the possessions of King John in France, after the supposed murder of Arthur, 1203, prepared to invade England at the instance of the Pope, 1213,

Philip

turned his arms against Flanders, and gained the celebrated battle of Bouvines, 1214, and died in 1223. Philip Augustus was one of the ablest princes that ever reigned in France, both as a commander and an administrator.

PHILIP III., called the Hardy, the son of Louis IX. and Margaret of Provence. He was born in 1245, and succeeded his father 1270. In 1271 he possessed himself of Toulouse on the death of his uncle, Alphonso; in 1272 he repressed the revolt of Roger, Count of Foix, and in 1276 sustained a war against Alphonso X., King of Castile. The invasion of Sicily by Peter of Aragon, and the massacre of the French, known as the "Sicilian Vespers," caused him to make war against that prince, in the course of which he died in 1285.

PHILIP IV., called the Fair, or Handsome, son of the preceding by his first wife, Isabella of Aragon; born in 1268, and succeeded his father 1285.

He was engaged in wars with the English and Flemings, and in a quarrel with the Pope, in the course of which he was excommunicated. In 1303 the States-General were first assembled. In 1312 he suppressed the Templars. He died in 1314. He was an able but most despotic sovereign.

PHILIP V., called the Long, second son of the preceding; born about 1293, and succeeded to the throne in virtue of the Salic law, which excluded the daughter of his brother Louis X., who died in 1316. In his reign a cruel persecution began against the Jews, in the midst of which he died, in 1322.

PHILIP VI., called De Valois, was son of Charles, Count of Valois, a younger son of Philip the Hardy; born in 1293, and succeeded Charles le Bel, 1328. In his reign occurred the wars with Edward III. of England, who claimed the French crown, as grandson, by his mother, of Philip the Fair. Philip lost the battle of Cressy in 1346, when 30,000 men, and the chief of his nobility, were slain. He died during a truce with the English, in 1350.



PHILIP III., OF FRANCE.

Philip

SPAIN.

PHILIP I., surnamed the Handsome; born in 1498, was the son of Maximilian I., Emperor of Germany; and by his marriage with the heiress of Ferdinand V., King of Aragon, and Isabella, Queen of Castile, he obtained the Spanish crown. He died in 1506.

PHILIP II., son of the emperor Charles V. and Elizabeth of Portugal; born in Valladolid, in 1527. Of a cold and gloomy nature, he was educated by ecclesiastics, who did their best to make him both a bigot and a despot, and his reign an inexorable crusade against political and religious freedom. He married, in 1543, his cousin Mary of Portugal, who became the mother of Don Carlos, and died in 1545. In 1554, he received from his father the kingdom of Naples, and the same year, after troublesome negotiations, married Mary, Queen of England. He was disliked in England, and soon quitted it. His father gave up to him the Netherlands in October, 1555, and the kingdom of Spain early in the following year. He declared war on France, and induced Queen Mary to join him; won, by his troops under the Duke of Savoy, the memorable victory of St. Quentin over the French, in 1557, and was present in person at the capture of the town, which followed. He vowed never to witness another battle, and he never did. He vowed also to show his gratitude for his success by building a monastery, which he more than fulfilled in the magnificent Escorial. A second victory over the French at Gravelines, in 1558, was followed by the peace of Cateau-Cambresis. Immediately on his return to Spain, he began a terrible persecution of "heretics," and was the pitiless spectator at an *auto-da-fé* at which 40 persons perished at the stake.

The most momentous event of his reign was the revolt of the Netherlands, first excited by his edict against heretics, and his attempt to establish the Inquisition there in 1565, and resulting, after long years of war and desolation, in the establishment of the Dutch Republic. During this conflict the successive governors of the Netherlands under Philip were his sister Margaret (Duchess of Parma), the Duke of Alva, Don Luis de Requesene, Don Juan of Austria, and Alexander Farnese (Duke of Parma). In 1565, he persecuted the Christian Moors of Granada, and provoked a revolt, which began in 1569; and after the greatest atrocities on both sides, ended by the flight or submission of the Moors in 1571. On the death of Henry, King of Portugal, in 1580, Philip conquered that country and annexed it to Spain. He made immense preparations for an invasion of England; and in 1588, the year after Drake's attack on Cadiz, his great fleet, which he named "the Invincible Armada," sailed from Lisbon; but a great storm and con-

Philip

trary winds damaged and threw it into disorder, and it was defeated by the English. Philip carried on intrigues in France against Henry II. and Henry IV.; but his aim was



PHILIP II., OF SPAIN.

defeated by the conversion of the latter to the Roman faith. He lived to see the failure of his designs on the Netherlands, on France, and on England. It was Philip II. who removed the seat of government from Toledo, and made Madrid the capital of Spain. He died at the Escorial, after severe suffering, the fruit of his debaucheries, Sept. 13, 1598.

PHILIP III., son of Philip II. and his fourth wife, Anne Mary, of Austria; born in 1578. He succeeded his father in 1598, and the following year married the Princess Margaret of Austria, by whom he had seven children. He continued the war in the Netherlands; and his general, Spinola, took Ostend in 1604, after a siege of three years. But these successes were too costly, and Philip was compelled to recognize the independence of the United Provinces, and to make a truce with them in 1609. The king was indolent, and took little part in the government, and his favorite and prime minister, the Duke of Lerma, had little capacity for his task. One of the most memorable, and for Spain most disastrous, of his measures was the expulsion of the Moors—industrious farmers and traders, most of them. Whole provinces were depopulated. He died in 1621. From the reign of this king the decline of the Spanish nation may be dated.

PHILIP IV., son of Philip III. and Margaret; born in Valladolid, in 1605, married Elizabeth, daughter of Henry IV. of France, and succeeded his father in 1621. He chose for his first minister the Count of Olivarez,

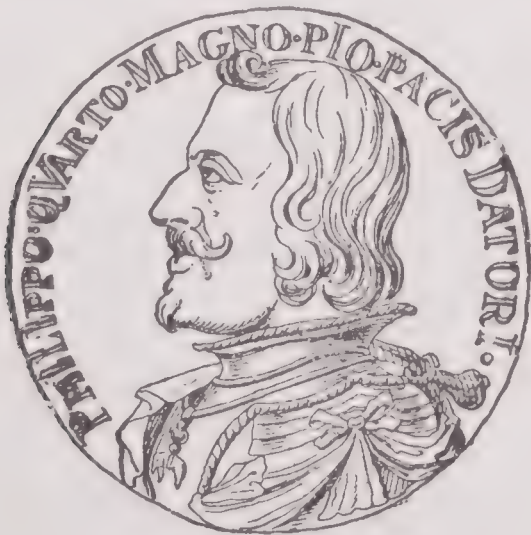
Philip

whose ambitious policy and despotic administration brought so many calamities on the kingdom. War was renewed with the Dutch,



PHILIP III. OF SPAIN.

and only ended at the peace of Westphalia; war with France began in 1635, and lasted till 1659, when the peace of the Pyrénées was concluded, and the Infanta Maria Teresa was married to Louis XIV.; and a formidable revolt broke out in Catalonia, which was finally reduced by Don Juan in 1652. It was in the third year of this reign that the strange visit of Prince Charles of En-



PHILIP IV. OF SPAIN.

gland, with the Duke of Buckingham, to Madrid took place, for the purpose of wooing the Infanta. Portugal threw off the yoke of Spain in 1640, and war followed, which was terminated by the victory of the Portuguese at Villaviciosa, in June, 1665. This last of the long series of losses and calamities broke Philip's heart, and he died in September of the same year. His queen, Elizabeth, died in 1644, and five years after he married the Princess Mary Anne, daugh-

Philip

ter of the Emperor Ferdinand III., who long survived him. It is said that Philip was only seen to smile three times in his whole life. The great painter Velazquez was court-painter to Philip IV.

PHILIP V., Duke de Anjou, the second son of Louis, dauphin of France, and Mary Anne of Bavaria; born in 1683, assumed the title of King of Spain in 1700, by virtue of the will of Charles II. His claim, however, was contested by the house of Austria, in favor of the Archduke Charles. This introduced the great War of the Spanish Succession, in which Austria was supported against France and Spain by England, Holland, Savoy, Portugal, and Prussia. The beginning of this war was very disastrous to Philip, who lost Aragon, Gibraltar, and the islands of Minorca and Majorca, also Sardinia and the kingdom of Naples. The victories of the Duke de Vendôme, and those of Marshal Villars in Flanders, confirmed Philip on the throne, and restored peace to Europe by the treaty of Utrecht, in 1713. The war was renewed in 1717, and the Spanish fleet was defeated in the Mediterranean by Sir George Byng. Peace was restored in 1720, after which Philip became a victim to confirmed melancholy, and in 1724 abdicated the throne to his son Louis, and retired to a monastery. Louis died a few months after of the smallpox, and Philip was compelled to resume the government. His subsequent conduct was characterized by greater spirit and judgment. In 1733, he entered into an alliance with France against the emperor, and his son Don Carlos conquered Sicily and Naples, of which he became king. In 1734, the royal palace was burnt, and a great number of fine paintings destroyed. In 1736 peace was concluded; but a new war broke out in 1739. He died in 1745.

Philip, sachem of the Wampanoag tribe of Indians, was the second son of Massasoit, who for nearly 40 years had been the first and staunchest ally of the Pilgrim settlers of Plymouth, and had obtained English names for his two sons. In 1661 Philip succeeded his brother, and formally renewed the treaties of his father, which he kept for some years. By 1671, however, goaded by the encroachments of the whites, he had formed a confederation of tribes aggregating nearly 10,000 warriors; and in 1675 what is known as King Philip's War broke out. On the Indian side it was a war of surprises and massacres—13 towns were destroyed, and 600 colonists slain. In December, 1675, Governor Winslow and a force of 1,000 men burned the great fort of the Narragansetts, slew 600 warriors, and massacred 1,000 women and children. In the spring the Indians retaliated for a time, but their numbers steadily diminished; several tribes fell away from the confederation; others, hitherto neutral, declared

Philip the Bold

against them. In the early summer Philip's squaw and little son were captured, and sold as slaves for the West Indies; and Aug. 12, 1676, at midnight, he and his remaining followers were surprised by Capt. Benjamin Church. Philip was slain and his head cut off. Afterward his body was drawn and quartered, and the head was exposed on a gibbet at Plymouth.

Philip the Bold, Duke of Burgundy; born in 1342, was the fourth son of John, King of France. He fought at Poitiers (1356), where, according to Froissart, he acquired the surname of the Bold. He shared his father's captivity in England, and on his return his father, whose favorite he was, made him Duke of Touraine, gave him the Duchy of Burgundy, and made him premier peer of France. He was one of the most powerful French princes during the minority of Charles VI., during whose insanity he acted as regent, retaining the regency till his death in 1404.

Philip the Good, Duke of Burgundy, one of the most powerful sovereigns of his time, son of John "Sans-Peur"; born in Dijon, in 1396. He succeeded on the assassination of the duke, his father, 1419, and at once formed an alliance with Henry V. of England, and joined in the treaty of Troyes, which declared Henry regent and heir of France. He fought on the English side for several years, and gave his sister Anne in marriage to the Duke of Bedford. But jealousy and dissension arose, and Philip abandoned the English alliance, and his reconciliation with Charles VII. of France was effected at the great Congress of Arras, 1435, attended by legates of the Pope and the Council of Basle, and ambassadors from almost all the States of Christendom. He had married in 1430, for his third wife, Isabella of Portugal, in whose honor he instituted the Order of the Golden Fleece, long the highest in Christendom. Philip extended his dominions by the conquest of Brabant, Holland, and Hainault, but revolts broke out in several of the great towns, which were only suppressed by the most severe measures. The town of Dinant especially was besieged, stormed, burnt to ashes, and all its inhabitants massacred, Philip being present to see this act of vengeance. He died in Bruges, June 15, 1467, and was succeeded by his son, Charles the Bold.

Philip I., The Magnanimous, Landgrave of Hesse; born in 1504. He began to reign at the age of 14, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, subscribed the protestation to the Diet of Spire in 1529, submitted the Confession of Faith at Augsburg in 1530, and in 1531 formed with the Protestant princes the Schmalkalden League. He was forced to

Philippi

submit to the Emperor Charles V. in 1547, who kept him a prisoner for five years. After his return to his dominions he sent a body of auxiliaries to assist the French Huguenots. He died in 1567.

Philip, John Woodward, an American naval officer; born in New York city, Aug. 26, 1840. He entered the naval academy in 1856, was made midshipman in 1861, and attached to the "Constitution" and "Santee." He was promoted to acting master in June of that year, and attached to the sloop-of-war "Marion" of the Gulf squadron. Later he was transferred to the James river fleet. He was made a lieutenant in 1862, and served on the "Chippewa," "Pawnee" and monitor "Montauk." He was wounded in the fight on Stone river while on the "Pawnee." He reached the rank of lieutenant-commander in 1868, and served in the European and Asiatic squadrons till 1874. In that year he was commissioned commander and assigned to the "Adams," was in command of the Woodruff scientific expedition, and later was engaged in coast surveys. He was on shore duty till 1890, commissioned captain in 1899, and was the inspector of the "New York" during construction. During the war with Spain he commanded the battleship "Texas," which took an active part in the capture of the Spanish fleet under Cervera, at Santiago de Cuba, July 3, 1898. He died in Brooklyn, N. Y., June 30, 1900.

Philiphaugh, on Yarrow Water, 3 miles W. S. W. of Selkirk, Scotland, the property from 1461 till 1889 of the line of the "Outlaw Murray" of the ballad. Here, Sept. 13, 1645, Montrose was defeated by David Leslie, who butchered more than 100 Irish prisoners.

Philippa, Queen, daughter of the Earl of Hainault; married to Edward III. of England in 1328. She accompanied Edward in some of his foreign expeditions, and at other times defended the kingdom in his absence.

Philippeville, a seaport of Algeria, the harbor of Constantine, from which it lies distant 54 miles N. N. E. There is a magnificent harbor (1882) protected by two moles, one 4,590 feet long, the other 1,310 feet. The town is quite new, having been built since 1838 on the site of the ancient Rusicada. The imports and exports together reach \$17,500,000 per annum. Pop. (1906) 26,050.

Philippi, a city of Macedonia; named after Philip II. of Macedon, who enlarged it because of the gold mines in its neighborhood. It is famous on account of the two battles fought in 42 B. C. between Antony and Octavianus on the one side and the republicans under Brutus and Cassius on the other, in the second of which the republic finally perished. The apostle Paul founded

a Christian church here, to which one of his epistles is addressed.

Philippian, of or pertaining to PHILIPPI (*q. v.*), or its inhabitants; also a native or inhabitant of Philippi. The Epistle of Paul the apostle to the Philippians, an epistle addressed by St. Paul, in conjunction with Timothy, "to all the saints in Christ Jesus which are at Philippi, with the bishops and deacons." Shortly after Paul had passed for the first time from Asia to Europe, he reached Philippi, then a Roman provincial capital and colony (Acts xvi: 12). It lay about 9 miles inland. His first convert, Lydia, was from Thyatira, in Asia Minor (Acts xvi: 14; Rev. i: 4, 11); his next was a certain damsel possessed with a spirit of divination (16-18) in connection with whom rioting occurred, followed by Paul's imprisonment, and the conversion of his jailer (19-40). Thus Paul was the founder of the Philippian church. Timothy was subsequently sent into Macedonia, and



COIN OF PHILIPPI.

doubtless to Philippi (xix: 22), Paul himself following (xx: 1-6). Compare with the facts regarding Timothy, Philippians i: 1 ii: 19-23). The Philippians had oftener than once sent the apostle pecuniary contributions (iv: 10-18), long being the only church which had done so. Epaphroditus had brought these gifts (ii: 25, iv: 18), and afterward falling very dangerously sick (ii: 26, 27), Paul had sent him back that the Philippians might be assured of his recovery, apparently requesting him to carry with him the epistle (ii: 28). The apostle when he sent the epistle was a prisoner in Rome (i: 7, 13; iv: 22). He expected release (i: 25; ii: 24), though martyrdom was by no means impossible. He expresses intense affection for the Philippians (i: 8), and thankfulness for their Christian character (i: 4). He counsels them to avoid strife, vainglory, murmurings, controversies (ii: 3-14), points to the Son of God as the exemplar of humility and self-sacrifice (ii: 5-11), and warns his readers against Judaizing teachers (iii: 2-14), and immoral, self-seeking men (18, 19). The Christians sending salutations to the church at Philippi were chiefly of Cæsar's household (iv: 22). The genuineness of this epistle is generally admitted, though Baur (1845), and Schweigler (1846), held the contrary view. Its date was probably early in A. D. 63.

Philippic, the title of several orations of Demosthenes against Philip, King of Macedonia, the spirit and animosity of which caused the name to be transferred to similar compositions by other orators. Thus, Cicero gave this name to the orations which drove Marc Antony from Rome, and compelled the Senate to prosecute the war against him after the murder of Julius Cæsar.

Philippine Islands, an archipelago in the Pacific Ocean; extending almost due N. and S. from Formosa to Borneo and the Moluccas; embracing an extent of 16° of latitude and 9° of longitude; comprising more than 1,200 islands, of which the two largest are Luzon and Mindanao; area, about 52,650 square miles; pop. (1899) 6,709,810. The archipelago was ceded by Spain to the United States as a result of the war of 1898, the United States government making a payment of \$20,000,000 to Spain, and subsequently \$100,000 for the cession of the islands of Cagayan and Cibitue, which were omitted in the treaty of peace.

The following official report by Maj. Gen. Francis V. Greene, U. S. V., sets forth the conditions and interests of the islands at the time of the American occupation:

Area and Population.—These islands, including the Ladrones, Carolines, and Palaos, which are all under the government of Manila, are variously estimated at from 1,200 to 1,800 in number. The greater portion are small and are of no more value than the islands off the coast of Alaska. The important islands are less than a dozen in number, and 90 per cent. of the Christian population live on Luzon and the five principal islands of the Visayas group.

The total population is somewhere between 7,000,000 and 9,000,000. This includes the wild tribes of the mountains of Luzon and of the islands in the extreme South. The last census taken by the Spanish government was on Dec. 31, 1887, and this stated the Christian population to be 6,000,000 (in round numbers). This was distributed as follows:

Islands.	Area.	Population.	Per square mile.
Luzon	44,400	3,426,000	79
Panay	4,700	735,000	155
Cebu	2,400	504,000	210
Leyte	3,800	270,000	71
Bohol	1,300	245,000	188
Negros	3,300	242,000	73
Mindanao	34,000	209,000	6
Samar	4,800	186,000	38
Mondoro	4,000	67,000	17
Romblon	600	35,000	58
Nasbate	1,400	21,000	15
Total	104,700	5,940,000	333

The density of population in the six first islands named is nearly 50 per cent. greater than Illinois and Indiana (census of 1890),

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greater than in Spain, about one-half as great as in France, and one-third as great as in Japan and China. Various smaller islands, including the Carolines, Ladrones, and Palaos, carry the total area and Christian population to: area, 140,000 square miles; pop., 6,000,000; per mile, 43.

This is considerably greater than the density of population in the States E. of the Rocky Mountains. Owing to the existence of mountain ranges in all the islands and lack of communication in the interior, only a small part of the surface is inhabited. In many provinces the density of population exceeds 200 per square mile. The total area of the Philippines is about the same as that of Japan. In addition to the Christian population, it is estimated (in the "Official Guide") that the islands contain the following:

Chinese (principally in Manila).....	75,000
Moors or Mohammedans in Paragan and Jolo	100,000
Moors or Mohammedans in Mindanao and Basalan	209,000
Heathens in the Philippines.....	830,000
Heathens in the Carolinas and Palaos...	50,000
Total	1,264,000

In 1899 a census was taken by the United States authorities, chiefly for educational purposes, which showed a total of 6,709,810. The "Official Guide" gives a list of more than 30 different races, each speaking a different dialect, but five-sixths of the Christian population are either Tagalos or Visayas. All the races are of the Malay type. Around Manila there has been some mixture of Chinese and Spanish blood with that of the natives, resulting in the Mestizos, or half-breeds, but the number of these is not very great. As seen in the provinces of Cavite and Manila, the natives (Tagalos) are of small stature, averaging probably 5 feet 4 inches in height and 120 pounds in weight for the women. Their skin is coppery brown, somewhat darker than that of a mulatto. They seem to be industrious and hard-working, though less so than the Chinese.

By the Spaniards they are considered indolent, crafty, untruthful, treacherous, cowardly, and cruel; but the hatred between the Spaniards and the native races is so intense and bitter that the Spanish opinion of the natives is of little or no value. To us they seemed industrious and docile, but there were occasional evidences of deceit and untruthfulness in their dealings with us. The bulk of the population is engaged in agriculture, and there were hardly any evidences of manufactures, arts, or mining. The greater number seemed to be able to read and write, but I have been unable to obtain any exact figures on this subject. They are all devout Roman Catholics, though they hate the monastic orders. In Manila (and doubtless also in Cebu and

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Iloilo) are many thousands of educated natives, who are merchants, lawyers, doctors, and priests. They are well informed and have accumulated property. The bibliography of the Philippines is said to number 4,500 volumes, the greater part of which has been written by Spanish priests and missionaries.

Climate.—The climate is one of the best known in the tropics. The thermometer during July and August rarely went below 79° or above 85°. The extreme ranges in a year are said to be 61° and 97°. There are three well-marked seasons—temperate and dry from November to February, hot and dry from March to May, and temperate and wet from June to October. The rainy season reaches its maximum in July and August, when the rains are constant and very heavy. The total rainfall has been as high as 114 inches in one year. Yellow fever appears to be unknown. The diseases most fatal among the natives are cholera and smallpox, both of which are brought from China.

Mineral Wealth.—It is now generally known that the Philippines have such minerals as iron, gold, silver, copper, lead, granite, petroleum, limestone, and quartz, and that it is only a matter of time when these minerals will be mined and put into the commercial markets of the world. Long before the Americans first came here to engage in war a great many foreign prospectors were surveying lands and staking off claims with a view of eventually establishing plants for the working of the minerals of the islands. Since the Americans have been here, and the cities and towns have been properly garrisoned, small parties of Americans and others have organized for the purpose of prospecting for gold in the hills. These small outfits ordinarily report back with information concerning the existence of gold in placer deposits and in veins or ledges. Very often some nuggets are brought in by the men, but as yet all work is done on such a small scale and attended with so many hardships that there is no money in it. One party which went out from Iloilo on the Isle of Panay crossed over the mountains to the opposite side of the island, prospecting as they went, and located indications of the presence of valuable metals in places where white men never trod before. The party was obliged to go afoot nearly the entire distance, leaving their horses behind at Passi, for the trails could not be traversed by any four-footed animal.

The grasshopper eaters were met with in the mountains, and quantities of the grasshoppers were seen distributed over mats on the sunny side of hills in the process of drying out. When the grasshoppers are thoroughly dry they are worked into va-

rious forms of dishes, with sweets and cocoanut meat, making what is to the native a most excellent dish. But these natives seemed to be otherwise intelligent and particular as to their methods of eating and cleanliness, and in time could no doubt be trained to be good workers in the rich metal deposits in their country. Most of the natives realize the value of the minerals on their lands, but they are too lazy to work to secure the deposits. If there are indications of gold deposits the natives habitually work about in the vicinity and obtain what metal can be easily removed from the surface. It is very seldom, however, that they proceed in the effective American fashion for getting out the gold, and consequently they secure very little.

The apparatus at present employed for what little mining is done in the Philippines is very crude indeed. Some of the machinery was made more than 200 years ago, and continues serviceable only because it consists of but few parts, and these are mere pieces of hard wood arranged with split bamboo for a sieve, or a couple of iron rolls in stout hard wood beams for crushing purposes. No doubt, if Americans were to bring the proper kind of modern mining machinery to this country, they could make a great deal of money. The natives have been known to bring down gold-bearing quartz from the mountains and exchange it for a few trinkets or pieces of fabric from the stores, not knowing the value of the metal. They have no means for working quartz and are only too glad to exchange a cart load of it for a few dollars' worth of inferior textile goods or fancy articles. The native merchants who procure the quartz sometimes manage to dispose of it profitably to some one who knows its value and who will ship it to some country where the gold can be obtained. Very often, however, the quartz is simply used as relics or ornaments about the native merchant's store and house, he, as a rule, not knowing what to do with it or its real worth.

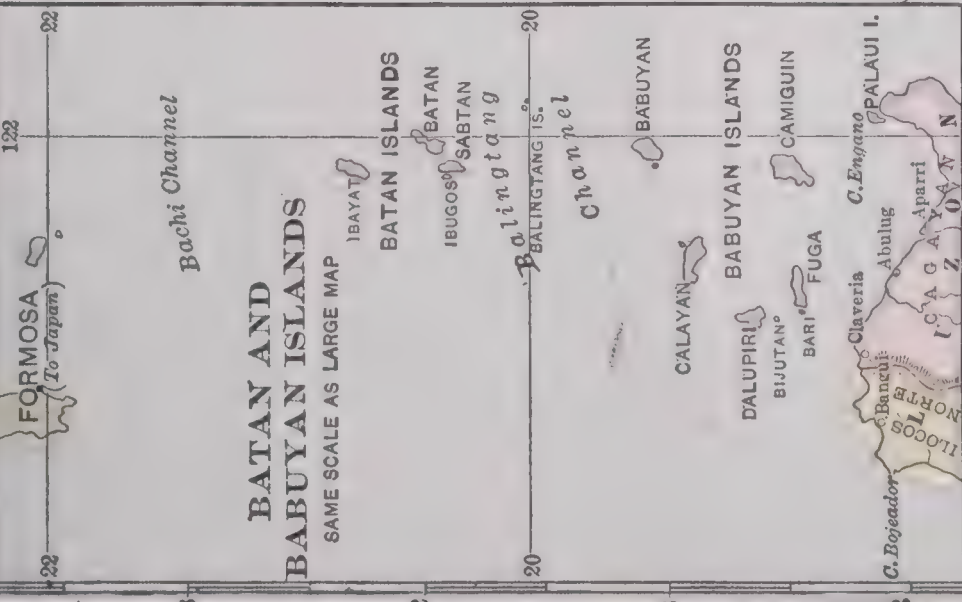
Should Americans establish mining enterprises in the Philippines they would be surprised at the cheapness with which good labor may be secured from among the native population. The mountain classes of natives are all strong, and they know what a day's work is. These native young men, having long since tired of warfare, are only too glad to get steady employment at the rate of 25 cents a day, American money. The writer has seen large numbers of native farmers, plantation help and others, engage in the various industries of the islands, paid off at the rate of only 15 cents a day, American money, and they seemed satisfied with the salary. Usually, when the pay is so low, the owner of the mine, plantation, or manufacturing industry, provides quarters for his help and also fur-

nishes them with rice, the cost per day per man being about 8 cents, American money. One reason why the country has always been at war is the lack of something for the young men to do to keep them out of harm. The native can live without working in this country because a small bamboo shack will afford him lodging, and he can build this himself. He requires only a shirt and trousers for clothing, and for living he can step into a cocoanut or banana grove or a rice field and procure all he wants to eat. This, of course, encourages laziness, and to pass the time away the native young man sometimes engages in war. If there were more mining enterprises in operation more young men would be given work, and the warring elements would in time cease for lack of fighting material. Therefore the military authorities of the islands are doing all they can to encourage the establishment of mining and general manufacturing enterprises, and if any capitalist were to start mining here he would find that his property would be amply guarded by the military.

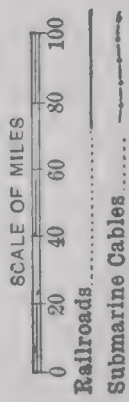
The time of working in this country differs from the time in other countries in that the intense heat of the middle of the day prevents hard labor, and usually the natives rest from 11 o'clock in the forenoon till 2 o'clock in the afternoon, and work later at night or begin earlier in the morning to make up for it. They manage to work from 10 to 11 hours a day.

One of the most important factors concerning the operation of a modern mining enterprise in any country is the care of and the repair of the machinery. There are from one to five or more machine shops in every city and town in the islands, but the equipment of machinery in these shops is very limited and what there is of it is very ancient. They have no boring devices except such as can be worked by hand. There are no planers, cutting tools, turning lathes or anything of the kind, though the government shops at Manila, Iloilo, and other important points have put in some of the most important metal working tools and machinery. The mining managers would have to bring with them their repairing and constructing machinery and put up a little repair shop of their own.

The principal gold mines are in the province of Camarines Norte, where this metal has already been taken out and sent to other countries for working. The mountain tribes have for many years brought gold nuggets out of these and surrounding provinces, but as a rule the natives will not disclose to foreigners the precise locality. In the island of Mindanao there has been considerable prospecting lately with the result that many parties have returned with encouraging reports of what they saw and what they found. A great many claims



PHILIPPINE ISLANDS



Size of type indicates relative importance of places



Hammond's 8 x 11 Map of Philippine Islands
Copyright, 1906, by C.S. Hammond & Co., N. Y.

A 118 B 120 C Longitude 122 East from D Greenwich 134 E 136 F

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were staked off for future working. The leading points at which gold was discovered are in the vicinity of Tagsulip, Misamis, and Cuenca. In the provinces of Benguet and Lepanto both gold and silver were found. On the island of Luzon gold has been discovered in several places and usually in profitable working quantities, but lack of proper facilities for handling the output prevented the members of the prospecting parties from doing much more than staking claims and securing samples and descriptions of the conditions. In the Baler mountains a great deal of gold was located and some fine specimens secured and exhibited. The rivers of Ango, Santa Maria, and San Jose contain gold deposits in the sands on their banks.

In the district of Paraclae, in Camarines Norte, there is already a profitable copper mine in operation, and there is said to be ample opportunity for establishing additional mines there with the chances of good success.

It was only a few years ago that systematic geological research was begun in the many islands of the Philippines, and the progress of operations has many times been stopped by wars. It was always considered dangerous for prospecting parties to go very far into the mountains, and the bones of many daring men are up in the hills now as a result of going too far into a country where white men were still unknown. Up to the present time only a very small proportion of the country has been prospected by any except the natives, and in most instances the native prospectors would pass right over a mine and not know it, unless there were liberal signs of the metal on the surface. They possess no instruments for testing, and would not know gold when they saw it unless the metal happened to glitter and thus attract their eye. The portions of the islands which have thus far been investigated by trained miners and experienced mining engineers present a very encouraging prospect, and if the metal exists in unexplored sections in the same proportion that it exists in the sections already explored these islands must be very rich in minerals. There are thousands of extensive unexplored ranges of hills and mountains on all of the islands of the group that probably contain more or less quantities of metals, and which in time will be discovered and worked.

There is a plant at San Isidro, Luzon Island, for the working of petroleum, and this article has been found in quantities in the island of Panay near Iloilo, and on the island of Cebu. There is a great demand in all of the islands of the group for petroleum oil for lighting and general purposes of cooking. The present cost of the oil is exceedingly high, and it is usually sold in bottles, quart bottles retailing

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at 10 cents each, American money. This makes it costly to have lights burning to any great extent, yet the natives use the petroleum oil very freely. Their oil account is often one-half their expense of living. Some good oil plants, if established in this country, would bring the price of oil down to the proper level. At present the oil plants in operation can barely more than furnish oil for the markets in their immediate vicinity, and the oil consumed in all other places on the islands comes from Russia and the United States.

Gold is reported on Luzon, coal and petroleum on Cebu and Iloilo and sulphur on Leyte. The imports of coal in 1894 (the latest year for which statistics have been printed) were 91,511 tons, and it came principally from Australia and Japan. In the same year the imports of iron of all kinds were 9,632 tons. If the Cebu coal proves to be of good quality, there is a large market for it in competition with coal from Japan and Australia.

Agriculture.—Though agriculture is the chief occupation of the Philippines, yet only one-ninth of the surface is under cultivation. The soil is very fertile, and even after deducting the mountainous areas it is probable that the area of cultivation can be very largely extended and that the islands can support a population equal to that of Japan (42,000,000). Lack of irrigation prevents the development of extensive tracts that could by a little enterprise be made very productive; and many districts now lose crops and suffer for lack of food because the cultivators trust solely to the rains for watering. Another serious drawback to agriculture in these islands is the difficulty experienced in getting crops to market, on account of the lack of good roads, the result being that districts produce only what is needed for their own subsistence. A further disadvantage under which the tillers of the soil labor is lack of sufficient capital and the high price of loans. The want of suitable agricultural instruments also retards progress, the methods employed being primitive and imperfect. The greater part of the people have no idea of what agriculture really means. The chief products are rice, corn, hemp, sugar, tobacco, cocoanuts, and cacao. Coffee and cotton were formerly produced in large quantities—the former for export and the latter for home consumption; but the coffee plant has been almost exterminated by insects, and the home-made cotton cloths have been driven out by the competition of those imported from England. The rice and corn are principally produced in Luzon and Mindoro and are consumed in the islands. The rice crop is about 765,000 tons. It is insufficient for the demand and 45,000 tons of rice were imported in 1894; also 8,669 tons (say 60,-

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000 barrels) of flour, of which more than two-thirds came from China and less than one-third from the United States. The cacao raised in the S. islands amounts only to 150 tons, and is all made into chocolate and consumed in the islands.

The sugar cane is raised in the Visayas. The crop yielded in 1894 about 235,000 tons of raw sugar, of which one-tenth was consumed in the islands, and the balance, or 210,000 tons, valued at \$11,000,000, was exported, the greater part to China, Great Britain, and Australia. The hemp is produced in S. Luzon, Mindoro, the Visayas, and Mindanao. It is nearly all exported in bales. In 1894 the amount was 96,000 tons, valued at \$12,000,000. Tobacco is raised in all the islands, but the best quality and greatest amount in Luzon. A large amount is consumed in the islands, smoking being universal among women as well as the men, but the best quality is exported. The amount in 1894 was 7,000 tons of leaf tobacco, valued at \$1,750,000. Spain took 80 per cent. and Egypt 10 per cent. of the leaf tobacco. Of the manufactured tobacco 70 per cent. goes to China and Singapore, 10 per cent. to England, and 5 per cent. to Spain.

Cattle, goats, and sheep have been introduced from Spain, but they are not numerous. Domestic pigs and chickens are seen everywhere in the farming districts. The principal beast of burden is the carabao, or water buffalo, which is used for plowing rice fields as well as drawing heavy loads on sledges or on carts. Large horses are almost unknown, but there are great numbers of native ponies from 9 to 12 hands high, possessing strength and endurance far beyond their size.

Commerce and Transportation.—The internal commerce between Manila and the different islands is quite large, and is carried on almost entirely by water, in steamers of 500 to 1,000 tons. There are regular mail steamers once in two weeks on four routes—viz., Northern Luzon, Southern Luzon, Visayas, and Mindanao; also a steamer every two months to the Carolines and Ladrões, and daily steamers on Manila Bay. These lines are all subsidized. To facilitate this navigation extensive harbor works have been in progress at Manila for several years, and a plan for lighting the coasts has been made, calling for 43 principal lights, of which 17 have already been constructed in the most substantial manner, besides 16 lights of secondary importance.

There is only one line of railway, built by English capital, running from Manila N. to Dagupan, a distance of about 120 milés. The roads in the immediate vicinity of Manila are macadamized and in fairly good order; elsewhere they are narrow paths of soft black soil, which become al-

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most impassable in the rainy season. Transportation is then effected by sledges drawn through the mud by carabaos. There are telegraph lines connecting most of the provinces of Luzon with Manila, and cables to the Visayas and S. islands and thence to Borneo and Singapore, as well as a direct cable from Manila to Hong Kong. The land telegraph lines are owned by the government, and the cables all belong to an English company, which receives a large subsidy. In Manila there is a narrow-gauge street railway, operated by horse power, about 11 miles in total length; also a telephone system and electric lights.

Communications with Europe are maintained by the Spanish Transatlantic Company (subsidized), which sends a steamer every four weeks from Manila and Barcelona, making the trip in about 27 days; the same company also sends an intermediate steamer from Manila to Singapore, meeting the French Messagerie steamer each way. There is also a non-subsidized line running from Manila to Hong Kong every two weeks, and connecting there with the English, French, and German mails for Europe, and with the Pacific Mail and Canadian Pacific steamers for Japan and America.

There has been no considerable development of manufacturing industries in the Philippines. The only factories are those connected with the preparation of rice, tobacco, and sugar. Beautiful fabrics are woven by women on hand looms, from pineapple, silk and cotton fiber. The foreign commerce amounted in 1894 to \$23,558,552 in imports and \$33,149,984 in exports, 80 per cent. of which goes through Manila. About 60 per cent. of the trade is carried in British vessels, 20 per cent. in Spanish, and 10 per cent. in German. The commerce with other countries in 1894 was as follows:

Countries.	Imports	Exports
Spain	10.5	2.9
Great Britain	7.1	8.7
China	4.6	6.8
Germany	1.9	....
Saigon .....	.9	....
United States .....	.7	7.4
France .....	.7	1.2
Singapore .....	.4	1.7
Japan .....	.2	1.2
Australia .....	.1	2.6
Other countries	1.5	.6
Total	28.6	33.1

Next to Great Britain the United States is the largest consumer of the products of the Philippines, and they export to the United States nearly three times as much as to Spain. On the other hand, Spain sells to the Philippines 15 times as much as we do.

With the construction of railroads in the interior of Luzon, it is probable that an

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enormous extension could be given to this commerce, nearly all of which would come to the United States. Manila cigars of the best quality are unknown in America. They are but little inferior to the best of Cuba and cost only one-third as much. The coffee industry can be revived and the sugar industry extended, mainly for consumption in the far East. The mineral resources can be explored with American energy, and there is every reason to believe that when this is done the deposits of coal, iron, gold, and lead will be found very valuable. On the other hand, we ought to be able to secure the greater part of the trade which now goes to Spain in textile fabrics, and a considerable portion of that with England in the same goods and in iron.

Revenue and Expenses.—The budget for the fiscal year ending June 30, 1897, was as follows:

INCOME.	
Direct taxes	\$ 8,496,170
Indirect taxes	6,200,550
Proceeds of monopolies.....	1,222,000
Lottery	1,000,000
Income of government property.....	257,000
Sundry receipts	298,300
Total	\$17,474,020
EXPENSES.	
General expenses, pensions, and interest	\$ 1,506,686
Diplomatic and consular service.....	74,000
Clergy and courts.....	1,876,740
War department	6,035,316
Treasury department	1,392,414
Navy department	3,562,716
Civil administration	2,195,378
Education	614,895
Total	\$17,258,145

The largest source of income is the cedula or poll tax. Every man and woman above 18 years of age residing in the Philippines, whether Spanish subject or foreigner, is required to have in his or her possession a paper stating name, age, and occupation, and other facts of personal identity. Failure to produce and exhibit this when called on renders any one liable to arrest and imprisonment. This paper is obtained from the internal revenue office annually, on payment of a certain sum, varying, according to the occupation and income of the person, from 75 cents to \$20, and averaging about \$3 for each adult. An extra sum of 2 per cent. is paid for expenses of collection. The tax is collected at the tribunal in each pueblo, and 20 per cent. is retained for expenses of local administration and 80 per cent. paid to the general treasury. This tax falls heavily on the poor and lightly on the rich. The tax on industry and commerce is similarly graded, according to the volume of business transacted by each merchant or mercantile corporation. The tax on real estate is absurdly low and is levied only on municipal property and on the rent, not the value.

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The tax on imports is specific and not *ad valorem*, it amounts to about 13 per cent. of estimated values. The free list is very small, nearly everything of commercial value which is imported being subject to duty. The revenue from imports has increased from \$566,143 in 1865 to \$3,695,466 in 1894. It was about the same in 1897. On the other hand, the export tax, which was nothing in 1892, the loading tax, which was nothing in 1893, and the unloading tax, which was nothing in 1894, have all been increased in the last few years in order to meet the expenses of suppressing the insurrection. These three items yielded nearly \$2,700,000 in 1897. The monopoly of importing and selling opium is sold by auction to the highest bidder for a term of three years. The last contract ran till 1899, and yielded \$48,000 per month. Every legal document must be drawn up on paper containing a revenue stamp engraved and printed in Spain, and every note, check, draft, bill of exchange, receipt, or similar document must bear a revenue stamp in order to be valid. These stamps and stamped paper yielded a revenue of \$646,000 in 1897. The lottery is conducted by the government, the monthly drawings taking place in the treasury (hacienda) department. The sale of tickets yielded \$1,000,000 over and above the prizes in 1897.

Currency.—The standard of value has always, till a few years, been the Mexican milled dollar. All valuation of goods and labor are based on the silver dollar, and a change to the gold standard would result in great financial distress. While trade would eventually adjust itself to the change, yet many merchants would be ruined in the process and would drag some banks down with them. The Mexican dollar is the standard also in Hong Kong and China, and the whole trade of the far East has for generations been conducted on a silver basis. Japan has broken away from this and established the gold standard, but in doing so the relative value of silver and gold was fixed at 32½ to 1, or about the market rate.

Public Debt.—I was unable to obtain any precise information in regard to the colonial debt. The last book on statistics of imports and exports was for the fiscal year 1894; and the last printed budget was for 1896-1897, which was approved by the queen regent in August, 1896. Subsequent to this date, according to the statements made to us by foreign bankers, the Cortes authorized two colonial loans of \$14,000,000 (silver) cash, known as series A and series B. The proceeds were to be used in suppressing the insurrection. Both were to be secured by a first lien on the receipts of the Manila custom house. Series A is said to have been sold in Spain and the proceeds to have been paid in the colonial office, but

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no part of them has ever reached the Philippines. Possibly a portion of it was used in sending out the 25,000 troops which came from Spain to the Philippines in the autumn of 1896. Series B was offered for sale in Manila, but was not taken. An effort was then made to obtain subscribers in the provinces, but with little or no success. The government then notified the depositors in the Public Savings bank (a branch of the treasury department similar to the postal savings bureaus in other countries) that their deposits would no longer be redeemed in cash but only in series B bonds. Some depositors were frightened and took bonds; others declined to do so. Then came the blockade of Manila, and all business was practically suspended.

American Reorganization.—On Jan. 17, 1899, President McKinley appointed a commission consisting of Jacob G. Schurman, Admiral George Dewey, Maj.-Gen. Elwell S. Otis, Col. Charles Denby, and Dean S. Worcester, to report on the affairs of the Philippine islands. The report of this commission was sent to Congress in February, 1900. It stated the impossibility of withdrawing the protection and government of the United States from the islands; and recommended the establishment of public schools; and, as far as possible, a civil government to replace the military. It also assured Congress of the willingness of the representative body of the population to accept the protection, guidance, and authority of the United States. On April 17, 1900, President McKinley appointed a second commission, comprising William H. Taft, Dean S. Worcester, Luke E. Wright, Henry C. Ide, and Bernard Moses; and in a message to the Secretary of War defined the duties of the new commission. It was to follow out the suggestions of the previous commission in reference to civil governments and schools; to devise an equitable system of taxation; establish law courts, open civil positions to native candidates; to create civil measures in conformity with the habits, and customs of the people, yet consistent with the great principles of government of the United States; and to examine titles of disputed tracts of land.

On Jan. 31, 1901, the second (known as the Taft) commission enacted into law a code of civil government for the islands. It established a fair system of taxes, laid the basis for a primary school system, innovated a more exact method for collecting revenues, and created certain civil and judicial officers. On July 4, 1901, civil government was inaugurated in the Philippines. Judge Taft had been appointed civil governor; Gen. Adna R. Chaffee military governor; and the other four members of the commission made heads of the various civil departments.

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On Dec. 18, 1901, the Taft Commission submitted its annual report. It stated that the insurrection was confined to five provinces, and that the bulk of the population was law abiding.

The commission outlined a project which in brief contemplated the continuance for two years of the existing powers of the commission. Then it advocated a representative government to be formed composed of a civil governor, a legislative council, and a popular assembly, the powers of the latter being closely limited so as to prevent it from choking the government in making the budget during fits of passion or through inexperience. The President of the United States would, of course, reserve absolute veto power. The Filipinos should also have the right to be represented before Congress and the executive government at Washington by two delegates. A full account was given by the commission of the organization of the system of education which had been going on vigorously under Dr. F. W. Atkinson, the general superintendent. The English language was the basis of all public instruction, and nearly one thousand trained teachers from the United States already had been put to work in the towns and cities of the pacified provinces. On July 3, 1902, the President proclaimed amnesty to all political prisoners in the Philippines, and on July 6 Aguinaldo was given his liberty.

Commerce in 1901.—A comparative statement of the commerce of the Philippine Islands for the fiscal years, 1901 and 1900, showed that the total value of merchandise imported during the fiscal year, 1901, was \$30,279,406, as against \$20,601,436 for the fiscal year 1900. The total value of merchandise exported during the fiscal year 1901 was \$23,214,948, as against \$19,751,068 for the fiscal year 1900, an increase of 47 per cent. in the value of imports, and an increase of 17½ per cent. in the value of exports. The value of imports of merchandise from the United States was \$2,855,685, an increase of 72.4 per cent. over the previous year; of the United Kingdom, \$6,956,145, increase, 76.3 per cent.; of Germany, \$2,135,252, increase, 76.5 per cent., and of France, \$1,683,929, increase, 246.7 per cent. The value of exports of merchandise to the United States was \$2,572,021, a decrease of 27 per cent.; United Kingdom, \$10,704,741, increase, 72 per cent.; Germany, \$81,526, decrease, 16.3 per cent.; France, \$1,934,256, increase, 38.9 per cent.

Improvements.—By 1902 the United States had established supreme and lower courts; raised the police force to 6,000 men; enrolled 150,000 children in public schools with 1,000 American and 4,000 native teachers; spent millions on improving roads and harbors; and had nearly \$7,000,000 in the island treasury to meet outlays.

Philippine Islands

The most important legislation by Congress for the benefit of the Philippines was the final passage, Feb. 25, 1903, of the bill for regulating the currency of the islands. The law provides for the coinage of a peso of the weight of 416 grains and the gold peso of $12\frac{9}{10}$ grains is made the unit of value. Coinage of silver is restricted to the amount of \$75,000,000. Philippine silver is based on gold at the ratio of 2 pesos for \$1, and it is expected that the new law will not only drive Mexican silver out of use in the islands, but will have a considerable influence on the modification of the debased silver currency of China and such other Oriental countries as adhere to the silver standard. The law also provided for the issue of certificates of indebtedness to maintain the parity of the silver and gold pesos, such certificates outstanding at any one time to be limited to 20,000,000 pesos or \$10,000,000. All Spanish coins heretofore used in the islands as well as the Mexican dollar were made receivable for public dues at a rate to be fixed from time to time by the Civil Governor, preference, however, being given to the Philippine coins and certificates. The first installment of the new certificates, 5,000,000 pesos or \$2,500,000, was printed in Washington and shipped in September.

During the summer of 1903 a census of the islands was undertaken according to American methods. In the official returns the entire population was given as 7,635,426, of which 6,987,686 were classified as civilized, and 647,740 as wild or uncivilized. For comparison with the last Spanish census, on a preceding page, the returns, by provinces are of interest, as showing the growth of the former class in 1887-1903: Abra, 37,823; Albay, 239,434; Ambos Camarines, 233,472; Antique, 131,245; Basilan, 1,331; Bataan, 45,166; Batangas, 257,715; Benguet, 917; Bohol, 269,223; Bulacan, 223,327; Cagayan, 142,825; Capiz, 225,092; Cavite, 134,779; Cebu, 653,727; Cottabato, 2,313; Dapitan, 17,154; Davao, 20,224; Ilocos Norte, 176,785; Ilocos Sur, 173,800; Iloilo, 403,932; Isabela, 68,793; Jolo, 1,270; La Laguna, 148,606; La Union, 127,789; Lepanto-Bontoc, 2,467; Leyte, 388,922; Manila (city), 219,928; Marinduque, 51,674; Masbate, 43,675; Mindoro, 32,318; Misamis, 135,473; Negros Occidental, 303,660; Negros Oriental, 184,889; Nueva Ecija, 132,999; Nueva Vizcaya, 16,026; Pampanga, 222,656; Pangasinan, 394,516; Paragua, 27,493; Paragua Sur, 1,359; Rizal, 148,502; Romblon, 52,848; Samar, 265,549; Siassi, 297; Sorsogon, 120,454; Surigao, 99,298; Tarlac, 133,513; Tawi Tawi, 93; Tayabas, 150,262; Zambales, 101,381; and Zamboanga, 20,692.

The long-standing controversy over the

Philippine Islands

friars' lands was virtually brought to an end in December, 1903, when Governor Taft and M. Guide, representing the Holy See, reached an agreement whereby the ecclesiastical would sell their lands for \$7,250,000. The settlement provides for the purchase of 403,000 acres, comprising all the agricultural lands and holdings of the friars, with the exception of 12,000 acres, including a farm near Manila, which had been sold to a railroad company, and also one sugar plantation. The friars demanded \$15,000,000 for their property; Governor Taft offered \$6,000,000 after his conference with a commission of cardinals in Rome in June, 1902; and the agreement was a compromise. Secretaries Root and Shaw, on being advised of the settlement, had a conference with the President, and it was decided to issue \$7,000,000 of 4 per cent. bonds, redeemable after 10 and within 30 years, for payment. The Philippine Government proposed to sell the lands to the natives for a reasonable price, giving the occupying tenants the preference and allowing the payments to extend over a convenient number of years. The bonds are to be paid to the Pope and not to the orders in the Philippines.

The extraordinary increase in the exports of the Philippines during the fiscal year ending June 30, 1903, established a new record in the commercial history of the islands and for the first time since American occupation a balance of trade in favor of the islands is shown, in addition to the fact that their total foreign commerce was considerably larger than ever before. The following table shows the value of the Philippine trade, exclusive of gold and silver and government supplies, during each of the five fiscal years of American administration as compared with the average annual trade for periods prior thereto:

YEARS.	IMPORTS.	EXPORTS.	TOTAL.
Average annual 1880-1884.	\$19,500,274	\$20,838,325	\$40,338,599
" " 1885-1889	15,789,165	20,991,265	36,780,430
" " 1890-1894	15,827,694	19,751,293	35,578,987
1899.....	13,113,010	12,366,912	25,479,922
1900.....	20,601,436	19,751,068	40,352,504
1901.....	30,279,406	23,214,948	53,494,354
1902.....	32,141,842	23,927,679	56,069,521
1903.....	32,971,882	33,121,780	66,093,662

In 1907 there were about 8,000 miles of telegraph line and cable in and between the islands; a railway of 120 miles runs between Manila and Dagupan, and franchises for the construction of about 720 miles of railway on the larger islands have been granted. In November, 1906, James F. Smith, of California, succeeded Luke E. Wright as governor-general of the islands. On Oct. 16, 1907, the first Philippine Assembly was inaugurated at Manila, with Osmena, ex-governor of Cebu, presiding.

Philippium

See IMPERIALISM: LUZON: MANILA: MANILA BAY, BATTLE OF; and titles of persons and places connected with the American occupation of the Archipelago.

Philippium, an element closely allied to cerium. Though described by Delafontaine in 1888 as a newly discovered element, it was not till 1897 that it was acknowledged to be such by English chemists. Philippium has been found in gadolinite, samarskite and fergusonite. It appears in two sets of compounds, the philippous and the philippic, corresponding to a white acid and an orange oxide. The salts of the first series are colorless, quite stable, crystallize well, and correspond to the lanthenum and yttrium salts. Philippic oxide has a deep orange-red color. The constitution of philippium compounds remains to be established.

Philippones, a Russian sect, formed in the 17th century, a branch of the Roskolnikians, and so named from its founder, Philip Pustoswiät. They decline to serve as soldiers, refuse to take oaths, and use the liturgy of the ancient Russo-Greek Church.

Philippopolis, city of Bulgaria; former capital of Eastern Rumelia; 110 miles W. by N. of Adrianople. It manufactures silk, cotton, tobacco, leather, etc., and prepares and exports otto of roses (to the value of \$275,000). An outpost of the Macedonian kingdom, it was ruined by the Goths, captured by the Turks (1363), destroyed by an earthquake (1818), burned (1846), and occupied by the Russians (1878). Pop. (1905) 45,572, of whom nearly half are Turks, Greeks, and others than Bulgarians.

Philippson, Martin, a German historian; born in Magdeburg, June 27, 1846. He was appointed Professor of History in the University of Brussels, 1878. Among his works are: "Henry IV. and Philip III.: Origin of French Preponderance in Europe, 1598-1610" (3 vols. 1871); "The Age of Louis XIV." (1879); "Origins of Modern Catholicism" (1884).

Philips, Ambrose, an English poet and dramatic writer; born of a Leicester family in 1671. He was educated at Cambridge, and subsequently became one of the wits who frequented "Button's" in London. As a Whig politician he obtained various lucrative posts from the House of Hanover, while as a poet he was ridiculed by Swift and Pope, receiving the nickname of "Namby Pamby" (which has since formed a useful English adjective). He wrote six pastorals and three tragedies: the "Distrest Mother" (1712), taken from Racine; the "Briton" (1722); and "Humphrey, Duke of Gloucester" (1723). He died in 1749.

Philistines

Philips, or Phillips, Edward, an English writer; the elder of the two nephews brought up and educated by Milton; born in 1630. He became a student of Oxford, but left in 1651 without taking a degree. In 1663 he was tutor to the son of John Evelyn at Say Court, Essex. He wrote: "Life of Milton" (1694); "New World of English Words" (1658), a kind of dictionary; the "Continuation" of Baker's "Chronicle of the Kings of England" (1665); "Theatrum Poetarum, or a Complete Collection of the Poets" (1675); "Treatise on the Latin Tongue"; etc. He is supposed to have died about 1694.

Philips, Francis Charles, an English barrister, playwright, and novelist; born in Brighton, England, Feb. 3, 1849. After long service as officer in the army, he retired from it and became a barrister. From 1874 to 1880 he was lessee of the Globe Theater, London. His novels include: "As in a Looking-Glass" (1885), translated into several languages, and dramatized for Mrs. Beere and Sarah Bernhardt; "A Lucky Young Woman" (1886); "The Dean and his Daughter" (1887), dramatized; "Mrs. Bouverie" (1894); "Little Mrs. Murray"; etc. He was also collaborator in the acted plays "Husband and Wife"; "Godpapa"; "The Fortune of War"; "A Free Pardon"; etc.

Philips, John, an English writer; born in Bampton, Oxfordshire, England, in 1676. He was the author of three very popular poems, "The Splendid Shilling," an imitation of Milton; "Cider," an imitation of Vergil; and "Blenheim," a Tory celebration of Marlborough's great victory. He died in 1708.

Philipson, David, an American rabbi; born in Wabash, Ind., Aug. 9, 1862; was graduated at the University of Cincinnati and at the Hebrew Union College there in 1883, and became Professor of Homiletics in the Hebrew Union College, and president of the Hebrew Sabbath School Union of America. He was author of "The Jew in English Fiction" (1889); "Old European Jewries" (1894); "The Oldest Jewish Congregation in the West" (1894); etc.

Philistines, an ancient people, descended from Ham, the son of Noah. They emigrated at a very early date from Egypt into Syria, called after them Philistia, and afterward Palestine, though they possessed only the portion on the S. coast bounded by the hilly countries of Ephraim and Judah, and extending S. W. to the confines of Egypt. Their chief city, Gaza, is mentioned as early as 2218 B. C. They reduced the Israelites to subjection 1156 B. C. (Judges xiii: 1), but were compelled to set them at liberty by Samson, who destroyed their chief nobility by pulling down

the temple where they were assembled, 1117 B. C. (Judges xvi: 30). In the time of Eli, 1116 B. C. (I Sam. iv: 11), they seized the ark of the Lord, which they were compelled to restore by the miraculous plagues it brought upon them; and they sustained a severe defeat from Samuel at Mizpeh, 1096 B. C. (I Sam. vii: 2-13). In the reign of Saul they harassed the Israelites (I Sam. xiv: 52), and the death of that monarch occurred while fighting against them in Mount Gilboa, 1055 B. C. (I Sam. xxxi: 4). David gained several victories over the Philistines, and Jehoshaphat made them tributary to him, 912 B. C. (II Chron. xvii: 11). In the reign of Jehoram they invaded Judah, and carried away the king's wives and sons into captivity, 887 B. C. (II Chron. xxi: 17). They again invaded Judah, and took Bethshemesh and Ajalon, 740 B. C. (II Chron. xxviii: 18). Their country was invaded by the Assyrians and the Egyptians, who took their strong city of Ashdod. Pompey incorporated Philistia in the Roman province of Syria, 62 B. C.

Phillimore, Sir Robert Joseph, an English lawyer; born Nov. 5, 1810. He studied at Oxford, and, after serving the Board of Control, had a brilliant career at the bar. He sat in Parliament as a Whig from 1853 to 1857; and held in succession the offices of advocate-general (1862, when he was knighted), judge advocate-general (1871), judge of the Arches Court (1867-1875), and of the High Court of Admiralty (1867-1883). Made a baronet in 1881. His most important works are his "Commentaries upon International Law" (1854-1861; 3d ed. 1879), and his "Ecclesiastical Law of the Church of England" (1873). He died Feb. 4, 1885.

Phillip, John, an English painter; born in Aberdeen, Scotland, April 19, 1817. He was apprenticed to a painter and glazier, but in 1836 was sent by Lord Panmure to London, where he was ere long admitted to the schools of the Royal Academy. In 1839 he began to exhibit in the Academy Exhibition. Most of his early subjects were of Scotch character, such as a "Scotch Fair" and "Baptism in Scotland. In 1851 he went to Spain in search of health. On his return he became noted as a painter of the habits and customs of the Spanish people, and was known as "Spanish Philip." In 1853 he exhibited "Life among the Gypsies at Seville." His pictures for 1854-1855, "A Letter Writer of Seville" and "The Promenade," were purchased by the queen. In 1857 he became A. R. A., in 1859 R. A. "The Marriage of the Princess Royal" (1860) was a success, as was also the "House of Commons," containing upward of 30 portraits of the leading members of both sides of the House. But his main triumphs were in Spanish

subjects, such as "Glory" (1864) and "The Cigarette" (1864). He twice again visited Spain, and the year before his death in London (Feb. 27, 1867) made a short stay in Italy.

Phillips, Adelaide, an American singer; born in Stratford-on-Avon, England, in 1833. When seven years old she was taken to Boston, Mass., which was her residence the remainder of her life. Her voice was a fine contralto. She made her début Sept. 25, 1843, at the Boston Museum, as Little Pickle. She then appeared as a juvenile danseuse at Barnum's Museum in New York, under the name of "the Child of Avon." In 1846 she appeared at the Walnut Street theater, Philadelphia, as Rosa, in "John of Paris." In 1850, on the advice of Jenny Lind, she went to Paris and studied with Garcia. She sang in opera in Milan in 1854, and in 1856 in New York, in "Il Trovatore." She appeared later in Paris in the same rôle. Subsequently she sang in all the principal cities of the world. Her last appearance was in 1881. She died in Carlsbad, Oct. 2, 1882. Her sister Mathilde was also a contralto singer.

Phillips, George Searle, pseudonym JANUARY SEARLE, an English-American litterateur; born in England, in 1818. He was a well-known writer and lecturer of Yorkshire, England, who removed to this country and became prominent in literary circles. He published: "Chapters in the History of a Life"; "Memoirs of Wordsworth"; and "The Gypsies of Dane's Dyke." He died in 1889.

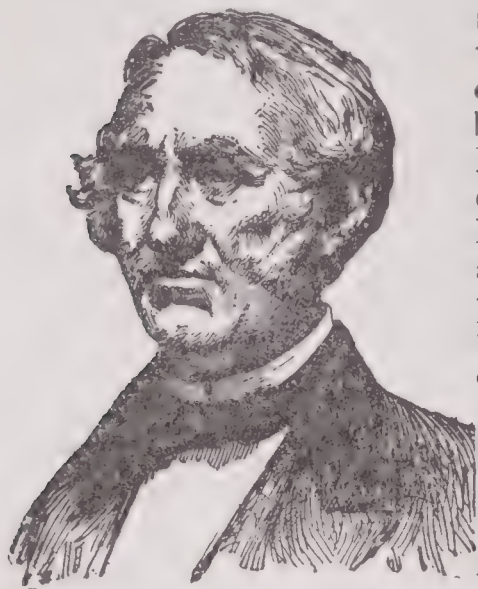
Phillips, Henry, an American writer and lawyer; born in Pennsylvania, in 1838. He wrote: "History of American Colonial Paper Currency"; "History of American Continental Paper Money"; "Pleasures of Numismatic Science"; "Poems from the Spanish and German." He died in 1895.

Phillips, John, an English geologist; born in 1800. He was instructed in geology by his uncle, William Smith, "the father of English geology," spent many years in arranging museums and organizing scientific societies in Yorkshire towns; became Professor of Geology in Dublin (1844), and in Oxford (1856). His chief works are a "Guide to Geology" (1834); "Palæozoic Fossils of Cornwall, Devon, and West Somerset" (1841); "Manual of Geology" (1855), and "Life on the Earth" (1861). He died in 1874.

Phillips, Thomas, an English painter; born in 1770. In 1792 he exhibited some historical pieces, but soon after turned his attention to portrait painting. In 1808 he became a member of the Royal Academy, and in 1824 succeeded Fuseli as professor of painting. He published his "Lectures

on the History and Principles of Painting" in 1833. He died in 1845.

Phillips, Wendell, an American orator and abolitionist; born in Boston, Mass., Nov. 29, 1811. He was graduated at Har-



WENDELL PHILLIPS.

vard in 1831, studied law there, and was called to the bar in 1834. But before clients came he had been drawn away from his profession to the real work of his life. A timely speech in Faneuil Hall in 1837 made him at once the principal orator of the anti-slavery party; and henceforth, till the President's proclamation of Jan. 1, 1863, he was Garrison's loyal and valued ally, his lectures and addresses doing more for their cause than can well be estimated. He also championed the cause of temperance, and that of women, and advocated the rights of the Indians. In 1870 he was nominated governor by the Prohibitionists and the Labor Party. His speeches and letters were collected in 1863 (new ed. 1884). He died in Boston, Mass., Feb. 2, 1884.

Phillipsburg, a city in Warren co., N. J., on the Delaware river, and on the Lackawanna, the Lehigh Valley, the Central of New Jersey, and the Pennsylvania railroads; 50 miles N. N. W. of Trenton. Two fine railroad bridges cross the river here and connect with Easton, Pa. Phillipsburg is in a limestone and iron-ore region; has several iron foundries, machine shops, a rolling mill, and manufactories of boilers, locomotives, mowers and reapers, and an assessed property valuation of nearly \$4,000,000. Pop. (1890) 8,644; (1900) 10,052; (1910) 13,903.

Philoctetes, in Greek legend, a famous archer, the friend and armor-bearer of Hercules, who bequeathed him his bow and poisoned arrows. As one of the suitors of Helen, he led seven ships against Troy; but being bitten in the foot by a snake (or, according to one story, wounded by his own arrows), he fell ill. The Greeks left him on the island of Lemnos, where for 10 years he spent a miserable life. But an oracle declared that Troy could not be taken without the arrows of Hercules, so Ulysses and Neoptolemus were dispatched to bring Philoctetes to the Greek camp; where, healed by Æsculapius or his sons, the re-

stored hero slew Paris, and helped powerfully in the taking of Troy. After the war he settled in Italy. The play of Sophocles is the only one of several written on the subject that has been preserved.

Philo Judæus, an Alexandrian Jew of the 1st century, who belonged to a wealthy family, received a liberal education, and in A. D. 40 visited Rome as one of a deputation to ask the Emperor Caligula to revoke the decree which compelled the Jews to worship his statue. His very numerous writings (which are in Greek) include an account of the Mosaic narrative of the creation, allegorical expositions of other parts of Genesis, lives of Abraham, Joseph, and Moses, treatises on the Decalogue, circumcision, monarchy, first-fruits, offerings, and other subjects.

Philolaus, a later Pythagorean; born in Crotona, or Tarentum, toward the close of the 5th century before Christ. Aresas, a probable disciple of Pythagoras, was his master; so that we receive the doctrine from Philolaus, only as it appeared to the third generation (see PYTHAGORAS). It has been stated that Philolaus divined the true theory of the Universe, and was the virtual predecessor of Copernicus. Nothing can be more false. In his scheme indeed, not the earth, but fire, is placed in the center of the Universe; that fire, however, is not the sun, which, on the contrary, he makes revolve around the central *pur* (fire). The scheme, so far as it can be understood, is altogether fantastic, based on no observation or comparison of phenomena, but on vague and now unintelligible metaphysical considerations.

Philology, in a popular sense: (1) Etymology, or the science of the origin of words. (2) Grammar, or the science of the construction of language in general and of individual languages. (3) Literary criticism, or the investigation of merits and demerits in style and diction. Of late years, however, a new and very extensive province has been added to the domain of philology; viz., the science of language in a more general sense, considered philosophically with respect to the light it throws on the nature of the human intellect and progress of human knowledge; and historically, with reference to the connection between different tongues, and the connection thus indicated between different nations and races. In this sense the term comprehends: (1) Phonology, or the knowledge of the sounds of the human voice; which appears to include orthography, or the system to be adopted when we endeavor to render, by our own alphabet, the sounds of a foreign language; (2) Etymology; (3) Ideology, or the science of the modification of language by grammatical forms, according to the various points of view from which

Philomela

men contemplate the ideas which words are meant to express.

Philomela, in Greek mythology, a daughter of Pandion, King of Athens, who being violated and deprived of her tongue by Tereus, the husband of her sister Progne, made known her wrong to the latter by embroidering it in tapestry. In revenge the sisters murdered Itys, the son of Progne by Tereus, and served him up to his father. Tereus pursued them, but they were changed by the gods into birds, Philomela and Progne into a nightingale and a swallow, and Tereus into a lapwing.

Philopœmen, called the last of the Greeks, really their last great commander. He was born in Arcadia, 253 B. C., became in 210, generalissimo of the Achaian League, and conquered the Spartans—at which time he abolished the laws of Lycurgus. The greatest of his victories in this long struggle was the battle of Mantinea. He was put to death by poison when a prisoner of the Messenians, 183 B. C., the same year that proved fatal to Hannibal and Scipio.

Philosopher's Stone, an imaginary stone sought for by the alchemists, which should transmute everything it touched into gold.

Philosophy, a term said by Diogenes Laertius to have been suggested by Pythagoras, who, on being complimented on his wisdom, said that he was not wise but a lover of wisdom (*philos sophia*), the Deity, alone being wise. Philosophy, while earnest in amassing knowledge, aimed chiefly at penetrating to the principles of things. Popularly, it is divided into natural and mental philosophy, the former investigating the physical laws of nature, the latter those regulating the human mind. The term philosophy is now generally restricted to the second of these. Even as thus reduced it has a very wide sphere. Thus, there is a philosophy of history (see HISTORY). The Hindus have six orthodox schools of philosophy, the Nyaya, the Vaisheshika, the Sankhya, the Yoga, the Purva Mimansa, and the Uttara Mimansa or Vedanta. All the nations of antiquity had a philosophy, that of the Greeks being specially celebrated. The chief schools were: The Pythagorean, commenced about 500 B. C.; the Platonic, 374 B. C.; the Peripatetic, 334 B. C.; the Sceptic, 334 B. C.; the Cynic, 330 B. C.; the Epicurean, 306 B. C.; the Stoic, 280 B. C.; the Middle Academy, 278 B. C.; the New Academy, 160 B. C.; the New Platonists, A. D. 200 (?). Of modern systems the perceptive and sensational philosophy of Locke arose about 1690; the idealistic of Berkeley and Hume, 1710; the common-sense philosophy of Reid, etc., 1750; the transcendental of Kant, 1770; the scientific

Phips

philosophy of Fichte, 1800; the idealistic philosophy of Hegel in 1810; the positive philosophy of Comte in 1830, and the evolutionary philosophy of Herbert Spencer in 1852, or more decidedly in 1855. Also the course of sciences read in the schools, and required for the degree of Doctor of Philosophy in the universities of Germany, etc., and corresponding to Arts in the United States.

Philosophy, Father of. See THALES.

Philostratus of Lemnos, a famous Greek sophist and rhetorician; born probably about A. D. 170–180. He studied under Proclus at Athens, and finally established himself at Rome, where he became a member of the learned circle that gathered round the Empress Julia Domna, wife of Severus. He was alive, according to Suidas, in the time of the Emperor Philip (244–249). His extant works are an idealized life of Apollonius of Tyana; the “Images,” a description of 64 pictures supposed to be hung in a villa near Naples; the “Lives of the Sophists,” a series of bright and interesting sketches; the “Heroicon,” a declamatory exercise on Homer’s injustice to Palamedes; and a series of amatory and somewhat strained “Epistles.”

Philoxenus, a Greek poet; born in the island of Cythera, about 435 B. C. He was taken prisoner in war, conveyed as a slave to Athens, and sold to the musician Melanippides, who gave him a liberal education. At the court of Dionysius, tyrant of Syracuse, he brought on himself condemnation to servitude in the quarries by refusing to praise the autocrat’s verses; when brought again before the tyrant and asked what he thought of the verses now, he answered, “Take me away to the quarries.” He took his revenge on Dionysius in his dithyramb “Cyclops.” He wrote 24 dithyrambs, and a lyric poem on the genealogy of the Æacidæ. Of his writings only scanty fragments remain. He died in Ephesus, 380 B. C.

Philtre, a potion supposed to have the power of exciting love. The preparation was frequently associated with magic rites, and the ingredients were frequently of a harmless, fanciful, or disgusting kind. At times, however, poisonous drugs were employed, the death of Lucretius and the madness of Caligula being alike ascribed to philtres administered by their wives.

Phips, or Phipps, Sir William, governor of Massachusetts; born in Pemmaquid (Bristol), Me., Feb. 2, 1651. He was successively a shepherd, a carpenter, and a trader, and in 1687 recovered from a wrecked Spanish ship off the Bahamas bullion plate, and treasure valued at \$1,500,000; this gained him a knighthood and the appointment of sheriff of New England. In 1690 he captured Port Royal (now Annapo-

lis) in Nova Scotia, but failed in the following year in a naval attack on Quebec. In 1692, through the influence of Increase Mather, he was appointed governor of Massachusetts. He at once put a stop to the witchcraft persecutions by appointing a commission of seven magistrates to try all such cases. He died Feb. 18, 1694, in London, England, whither he had been summoned to answer certain charges of arbitrary conduct.

Phiz. See BROWNE, HALBOT KNIGHT.

Phlebitis, inflammation of the veins. Though seldom an original or "idiopathic" disease, it is a frequent sequence of wounds, and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers.

Phlebolites, calcareous concretions formed by the degeneration of coagulations in veins, or occasionally originating in the coats of the vessel.

Phlebotomy, or **Venesection**, the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the processes of the medical profession from the earliest times.

Phlegethon (*i. e.*, "the Flaming"), a river of the infernal regions, whose waves rolled torrents of fire. Nothing would grow on its scorched and desolate shores. After a course contrary to the COCYTUS (*q. v.*), it discharged itself, like the latter stream, into the Lake of Acheron.

Phlegmasia Dolens, milk-leg, a brawny, non-œdematous, painful swelling, usually of the lower extremities, common after parturition. It may arise from spontaneous coagulation of the blood in the veins.

Phlogiston, a substance supposed by the earlier chemists to exist in all combustible matters, and to the escape of this principle from any compound the phenomenon of fire was attributed. The views held regarding it were, however, abandoned by chemists some time after the researches of Lavoisier on combustion.

Phlox, a genus of plants of the natural order *Polemoniaceæ*, distinguished by a prismatic calyx, salver-shaped corolla, and unequal filaments. The species are pretty numerous, mostly perennial plants with simple leaves, and mostly natives of North America. A number of species are common in British flower-gardens. It has become a favorite genus with florists, and many very fine varieties of the plant have been produced.

Phocæa, an Ionian city, in Asia Minor, originally a colony from Athens. It stood on a peninsula between the gulfs of Elais and Smyrna, and had an excellent harbor; and the Phocæans were distinguished among the Greeks for their nautical enterprise. When the city was besieged by the Persians in the time of Cyrus, many of its inhabitants emigrated to Corsica; Massilia (Marseilles) was a Phocæan colony. The old city survived into the later empire; its ruins are still known as Karadscha Tokia.

Phocas, Emperor of the East, at first a centurion in the army of the Emperor Maurice. In 602 he took advantage of the grievances and discontent of the soldiers to get himself elected emperor; a revolt at Constantinople followed, and Maurice and his five sons were murdered at Chalcedon, whither they had fled. Phocas was of low origin, and of equally low nature; ignorant, cowardly, and cruel, with no ambition as sovereign, but to indulge the more freely in lust and drunkenness. The Empress Constantina, accused of conspiracy, was tortured, and with her three daughters beheaded at Chalcedon; and numberless meaner victims perished without trial, and amid refinements of cruelty and torture. Yet Phocas was acknowledged both in the East and West, and his image, with that of his wife, Leontia, were set up in the Lateran by Pope Gregory, who stooped basely to flatter him. Chosroes, King of Persia, declared war on him and conquered several provinces of the empire, and at length the tyrant was overthrown and the empire delivered by Heraclius, son of the Exarch of Africa, who led an expedition to Constantinople in 610. Phocas was seized, put in chains, tortured, and beheaded, and his body burnt.

Phocion, an Athenian general and statesman; born about 400 B. C. He was a disciple of Plato and Xenocrates, served under Chabrias at the naval battle of Naxos, and became subsequently head of the peace party at Athens, steadily opposing Demosthenes and all bold patriots who were ready to fight for the independence of their country against the Macedonian invaders. He was a brave and successful soldier, and was 45 times appointed general; his private character was above suspicion, and that alone saved him from the infamy which his political course deserved. He was twice sent on embassies to Alexander the Great, and acquired his friendship. He is said to have advised that Demosthenes and other leading men should be given up to the Macedonians. When Athens was occupied by Polysperchon, Phocion fell one of the first victims to the enemies of his country whom he had aided. He was tried and sentenced to death, and met his end with philosophic composure, 317 B. C.

Phocis

Phocis, a province of ancient Greece, W. of Bœotia, and bounded S. by the Gulf of Corinth. The greater part of the country is occupied by the mountain range of **PAR-NASSUS** (*q. v.*). The State derives its chief historical importance from possessing the famous oracle of Delphi. During the Peloponnesian war the Phocians were close allies of the Athenians. In the time of Philip of Macedon they were involved in a 10 years' war, on account of their opposition to a decree of the Amphictyonic Council, concerning the use of a piece of land belonging to the temple of Delphi. This war, commonly known as the Sacred or Phocian War, ended disastrously for the Phocians, the whole of whose cities (22 in number) were destroyed, with one exception, and the inhabitants parcelled out among the hamlets. Phocis and Phthiotis form a province of modern Greece.

Phœbas, the priestess of Apollo, who delivered forth his oracles.

Phœbe, the Greek name of the goddess of the moon.

Phœbus (*i. e.*, "the Bright"), an epithet, and subsequently a name, of Apollo. It had reference both to the youthful beauty of the god and to the radiance of the sun, when, latterly, Apollo became identified with Helios, the sun god.

Phœnicia, in ancient geography, in the largest sense, a narrow strip of country extending nearly the whole length of the E. coast of the Mediterranean Sea, from Antioch to the borders of Egypt. But Phœnicia proper was included between the cities of Laodicea, in Syria, and Tyre, comprehending mainly the territories of Tyre and Sidon, and forming then only a part of the country of Canaan. Before Joshua conquered Palestine, this country was possessed by Canaanites, sons of Ham, divided into 11 families, of which the most powerful was that of Canaan, the founder of Sidon, and head of the Canaanites, properly so called, whom the Greeks named Phœnicians, probably from the beautiful purple color known as the Tyrian dye. Some authorities state that Agenor was the first King of Phœnicia, 1497 B. c.; but all agree that the country itself was the seat of a great nation, and renowned for its naval enterprise at a much earlier period. A colony of Phœnicians, led by Elissa or Dido, settled in Africa 878 B. c., and founded **CARTHAGE** (*q. v.*). Phœnicia was invaded by Shalmaneser IV., King of Assyria 723 B. c.; by Nebuchadnezzar, King of Babylon, 587 B. c.; and by Cyrus, King of Persia, 536 B. c. The Phœnicians subsequently assisted the Persians in their wars with the Greeks, and sustained a total defeat from Cimon, at the naval battle of the Eurymedon, 466 B. c. They revolted from Persia 352 B. c.,

Phœnixville

and were conquered by Alexander III. (the Great) 331 B. c. After his death, 323 B. c., Phœnicia was annexed to the dominions of Ptolemy (I.) Soter, King of Egypt. It was seized by Antigonos of Phrygia, 315 B. c., and passed under the protectorate of Tigranes I., King of Armenia, 83 B. c. It formed part of the Roman province of Syria 62 B. c., and was deprived of all its liberties by Augustus, 20 B. c.

Phœnix, or **Phenix**, in astronomy, one of the constellations of the Southern Hemisphere, N. of the bright star Achernar in Eridanus. In botany, the typical genus of the family *Phœnicidæ*. Dioecious trees with pinnate leaves; calyx three toothed; petals three, stamens six, rarely three or nine; filaments very short, ovaries three, only one coming to perfection. Habitat, Northern Africa and Southern Asia. Known species about 12. *P. dactylifera* is the date palm. *P. sylvestris* is the wild date, a tree 30 or 40 feet high, very common, both wild and cultivated, in India. The fibrous leaflets and the fibers from the petioles are manufactured into mats, ropes, and baskets; sugar is made from the sap of the tree, which, moreover, yields gum. The juice of *P. farinifera*, a small species in sandy parts of India, yields sago; its leaves are used in mat making, and those of *P. paludosa*, which grows in the Sunderbunds, for rough ropes and thatching. The fruit of *P. acaulis*, a stemless species from the Sub-Himalayas and Central India, is eaten by the natives, and the pith is made into sago. In entomology, *Cidaria ribesaria*, a geometer moth, the larva of which feeds on current and gooseberry bushes. In mythology, a fabulous female bird of Arabia, which was feigned to live for 500 or 600 years in the desert, when she built for herself a funeral pyre of wood and aromatic gums, to which she set fire by the fanning of her wings, and so consumed herself; but from the ashes she sprang up again in youth and freshness. Hence the phœnix is frequently found depicted as an emblem of immortality. In heraldry the bird is represented in coat-armor in flames. Figuratively, a paragon; a person or thing of extreme rarity or excellence.

Phœnix, a city, capital of Arizona, and county-seat of Maricopa co.; on the Southern Pacific railroad; 226 miles N. E. of Yuma. It is in a gold and silver mining region, and is the trade center for South Central Arizona. It contains banks, several churches, a court house, jail, and daily and weekly newspapers. It has machine shops, iron works, etc., and an assessed property valuation of over \$3,000,000. Pop. (1900) 5,544; (1910) 11,134.

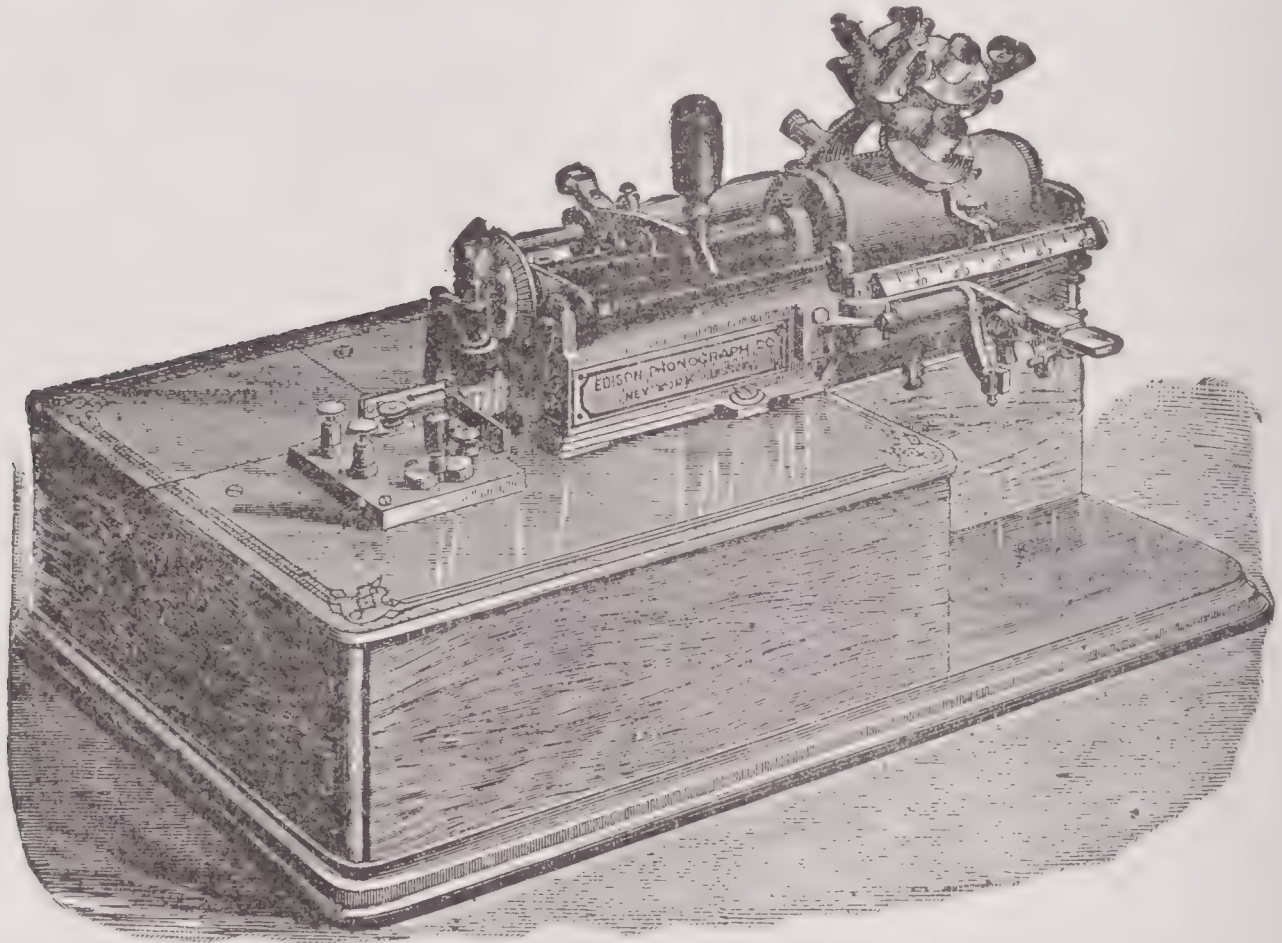
Phœnixville, a town in Chester co., Pa., at the confluence of French creek and the

Pholas

Schuylkill river, and on the Pickering Valley and the Philadelphia and Reading railroads; 23 miles N. W. of Philadelphia. Here are a seminary, several banks, many schools, and the Phoenix Iron and Bridge Works, the largest plant of its kind in the United States. This company executed an order from the British government after sharp competition with English and Scotch firms to build and erect an extensive iron bridge in the Sudan. Phoenixville also has manu-

Phonetic

Phonetic, or **Phonetical**, representing sound; pertaining to the representation of sounds; a term applied to alphabetic or literal characters which represent sounds, as a, b, c; as opposed to ideographic, which represent objects or symbolize abstract ideas, as in Egyptian hieroglyphics. **Phonetic spelling**, a system of spelling in which the words are spelled exactly as they are pronounced, the sounds being represented by characters each of which represents a

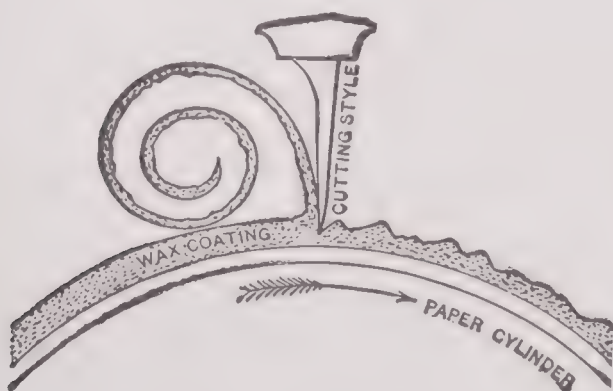


PERFECTED PHONOGRAPH.

factories of copper and cotton goods. The assessed property valuation exceeds \$3,000,000. Pop. (1900) 9,196; (1910) 10,743.

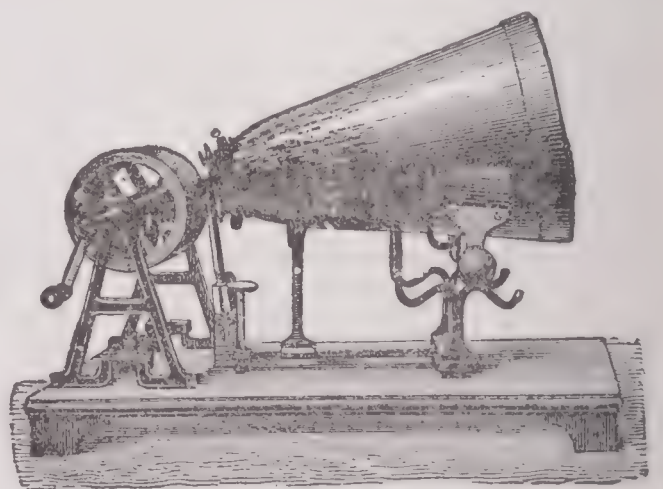
Pholas, piddock; the typical genus of the *Pholadidae*. Shell long, cylindrical,

single sound. Phonetic printing was first suggested by Isaac Pitman, of Bath England, and reduced to a system by him in conjunction with A. J. Ellis, in the years 1843-1846. Since that time many schemes



PHONOGRAPHIC RECORD.

accessory valves protecting the dorsal margin. Animal with a large, truncated foot, body with a fan-like termination. They live in symmetrical vertical burrows. Recent species 32, from most seas: fossil 25, from the Upper Lias onward.

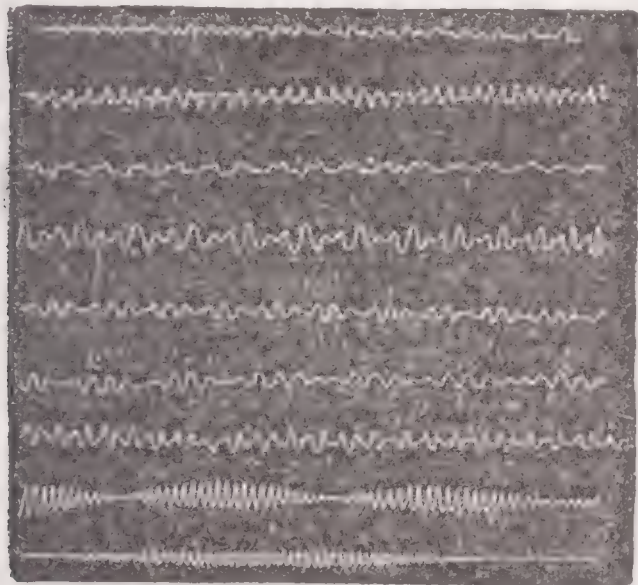


EDISON PHONOGRAPH.

of phonetic spelling have been proposed as improvements on the phonotypy by Pitman, and several are now in daily use by stenographers in the United States.

Phonograph

Phonograph, a character used in phonography; a type or character used for expressing a sound. Also an instrument for recording and reproducing sounds, invented by Thomas A. Edison. It consists of a cylinder of brass, mounted axially upon a steel screw, the pitch of which corresponds with that of a spiral groove on the outside of the cylinder. Attached to the baseboard by a moveable arm is a mouthpiece with a diaphragm, from the center of the under surface of which projects a steel point. To use the instrument, the cylinder is covered with tinfoil or wax, paraffine, or other inelastic, easily indented substance, and the arm so adjusted that when the axle is revolved, the whole of the groove on the



PHONOGRAPHIC RECORD.

cylinder will pass in succession under the point. On speaking into the mouthpiece, at the same time turning the cylinder, every vibration of the diaphragm causes the point to make a corresponding mark upon the tinfoil. The arm being temporarily turned back, the cylinder can now be set back to its original position, and on turning it with the mouthpiece in position as at first, the stylus, traveling over the indentations in the type-laden tinfoil, causes the diaphragm to vibrate as before, thus producing the original sounds.

Phonography, a description of the sounds uttered by the organs of speech. Also the representation of sounds by certain characters, each of which represents one sound, and always the same sound. Its special application is to alphabetical writing, in which sounds or articulations are represented by signs or letters, as opposed to the system in which the representation is by ideas, symbols, or cipher. Specifically, a method of writing, or graphically representing language, invented by Isaac Pitman, of Bath, England. See STENOGRAPHY. Also the art of using, or registering by means of, the phonograph; the construction of phonographs.

Phosphorescence

Phonolite. See CLINKSTONE.

Phonometer, an instrument for ascertaining the number of vibrations of a given sound in a given space of time.

Phonoscope, an apparatus for testing the quality of musical strings, invented by Koenig. Also a combination of an induction coil and battery with a rotating vacuum tube, for translating vibrations of sound into visible figures. For the contact breaker of the coil is substituted a diaphragm, so adjusted that every vibration of it will break the primary circuit, and cause a spark to pass along the tube. As this is rotated rapidly in the direction of its length, illuminated figures like spokes of a wheel are produced, which, provided that the rate of rotation is the same, are constant for any given sound.

Phorminx, an ancient Grecian lute or lyre.

Phosphate, in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all depleted soils. These phosphatic manures consist for the most part of bones, ground bones, mineral phosphates (apatite, phosphorite, coprolites), basic slag, superphosphates and reduced superphosphates (both prepared by treating broken-up bones with vitriol), bone ash and phosphatic guano.

Phosphatic Diathesis, a morbid tendency in the constitution to deposit phosphates of calcium, magnesium, ammonium, etc., which sometimes form calculi or are deposited from the urine.

Phosphides, compounds of phosphorus with one other element, more especially with the metals.

Phosphorescence, the property which many substances and organic beings possess of emitting light under certain conditions; also a phosphoric light. Becquerel traces five causes of phosphorescence: (1) Spontaneous action. (2) Elevation of temperature. (3) Mechanical action, as friction, percussion, or cleavage. (4) Electricity. (5) Isolation. Examples of No. (1) may be seen among plants in certain fungi, also at times in decaying wood. Among animals, some of Cuvier's sub-kingdom Radiata have the power of emitting light in the dark, especially if they are disturbed, and the phosphorescence of the sea in tropical, and even at times in temperate climates, is attributed to a small infusorial

Phosphoric Acid

animalcule, *Noctiluca miliaris*, aided by *Physalia utriculus*, and other Medusæ, Tunicata, Annelids, etc. On land, of insects, some millipèdes, the female glow-worm, and the fireflies, emit light. In the glow-worm the light is from the under side of the final segments of the abdomen. In the case of various Elateridæ the phosphorescence is from a small, white, oval spot on each side of the thorax. The phosphorescence of fish in a cupboard is well known; also of decaying animals in marshes.

Phosphoric Acid, in chemistry, H_3PO_4 , ortho-phosphoric acid, a tribasic acid formed by the action of nitric acid upon phosphorus, or by the hydration of phosphoric anhydride. The product in each case is fused to redness in a platinum vessel. On cooling, it is obtained as a transparent solid mass, in which state it is called glacial phosphoric acid. It is very deliquescent, has an intensely sour taste, and reddens litmus paper. It is not poisonous. It is given in a very dilute state in diabetes and scrofula.

Phosphorite, a species of calcareous earth; a sub-species of apatite. It is an amorphous phosphate of lime, and is valuable as a fertilizer.

Phosphoroscope, a philosophical toy, consisting of glass tubes arranged in a box and containing phosphorescent substances, as the sulphides of lime, strontium, barium, etc. When this is exposed to the sun's rays or to the light emitted by a gas-burner or burning magnesium, and then removed to a dark place, each tube appears to glow with light of a different color, as red, blue, green, etc. Also an instrument devised by Becquerel for measuring the duration of phosphorescence in different substances.

Phosphorous Acid, in chemistry, H_3PO_3 . Prepared by adding water to the trichloride of phosphorus, $\text{PCl}_3 + \text{H}_2\text{O} = \text{H}_3\text{PO}_3 + 3\text{HCl}$. The solution is evaporated to a syrup to expel the HCl, when the phosphorous acid crystallizes on cooling. It is very deliquescent, and readily attracts oxygen, passing into phosphoric acid. Heated in a close vessel, it forms phosphoreted hydrogen and phosphoric acid.

Phosphorus, in Greek mythology, the morning-star; Phosphor. In chemistry, symbol P; at. wt.=31, a non-metallic pentad element; found in a state of combination in the unstratified rocks, the soil, the organism of plants, and the bodies of animals. Discovered by Brandt in 1669. It is prepared from powdered calcined bones by treating them with two-thirds of their weight of sulphuric acid diluted with water, evaporating the liquid portion, and, after mixing with charcoal, desiccating by heating in an iron vessel. The dry mass is then introduced into a stone retort, heated, and

Photocollotype

the phosphorus evolved collected under water. It resembles imperfectly bleached wax, is soft and flexible at common temperatures; sp. gr., 1.77; vapor density, 4.35; melts at 42.2° , and boils at 287° . On cooling, it sometimes forms dodecahedral crystals. It is insoluble in water, and is kept in that liquid, but dissolves in native naphtha and bisulphide of carbon; is very inflammable, and sometimes takes fire from the heat of the hand. A remarkable modification exists under the name of amorphous phosphorus, prepared by exposing common phosphorus to 250° for 50 hours. It is a reddish-brown infusible substance, insoluble in bisulphide of carbon; sp. gr., 2.089–2.106. It is not luminous in the dark, and can be reconverted into ordinary phosphorus when heated to 260° . Used on a very large scale in the preparation of safety matches. It has been given in small doses in intercostal and trigeminal neuralgia, psoriasis, eczema, and goiter; but even in minute doses it is dangerous. In larger ones it produces jaundice, vomiting, hemorrhage, and death. Canton's phosphorus, in chemistry, CaS, calcium sulphide; a white amorphous substance, obtained by heating in a close vessel, a mixture of three parts oyster shells and one part sublimed sulphur. It is luminous in the dark. Named from John Canton, F. R. S. (1718–1772), an electrician and physicist.

Photius, patriarch of Constantinople in the 9th century, was a native of that city. He rose to the highest offices of the State before he entered into orders, which took place on the deposition of Ignatius in 857. Photius was deprived in his turn by Basilus in 867, but after living in exile 11 years, he forcibly regained his seat, which he kept till 886, and was then deprived by the Emperor Leo, who sent him into Armenia, where he died. His *Bibliotheca* (Library) contains the substance of nearly 300 ancient authors. He had great talents, but was fond of intriguing, and it was principally through his conduct that the separation of the Eastern and Western Churches took place.

Photocollotype, a process of printing from the surface of a film of gelatine, based upon the fact that gelatine, exposed to light, in the presence of an alkaline bichromate, loses its power of absorbing water. A piece of plate glass is coated thickly with a solution of gelatine and potassium bichromate, dried in the dark, and exposed to light under a reversed positive. It is next turned over and exposed, through the glass, to diffused light for a short time to diminish the swelling caused by the subsequent wetting. After well washing to remove the superfluous bichromate, it is rolled with greasy ink which only adheres perfectly to the parts which have

Photoelectric Microscope

not absorbed water, and to the others in proportion to their dryness. The subsequent manipulations are as in lithography.

Photoelectric Microscope, a microscope illuminated by the electric light so that the image of the magnified body can be thrown on a screen in a darkened room.

Photoelectrotype, a block made mainly with the aid of photography and of the electrotyping process, and which can be printed with type like a woodcut. A photographic negative of the subject required is printed on a film of gelatine which has been treated with bichromate of potash, to render it sensitive to the action of light. Those parts on which the light has not acted are soluble in water, and are washed away, leaving the printed parts that are insoluble in relief. From this relief a mold in wax is taken, and an electrotype made in the usual way. Unless special means are taken to translate the half-tones of the photograph into line or stipple, this process is only available for reproducing drawings, etc., in black and white.

Photoengraving, a term applied to producing printing blocks or plates by photography. The most commonly employed process is to coat a metal plate with a thin film of asphaltum, and expose it to light under a reversed positive. The picture is next developed by dissolving away the parts of the asphaltum not acted upon by the light, and the plate is subsequently etched in the usual way. This process is sometimes called photo-aquatint. The second method is more elaborate. A film of bichromatized gelatine, on a sheet of glass or a copper plate, is exposed under a photographic negative, and the unprinted portions which are soluble in water washed away, leaving the printed parts in relief. The plate with the relief is next coated with a film of silver by electro-deposition, and placed in an ordinary electrotyping bath, in which it is allowed to remain till a shell of copper from one-sixteenth to one-eighth of an inch thick (according to size of plate) is formed. This, after the rough excrescences have been removed by filing, becomes the printing plate. It can be worked upon by an engraver, if necessary, to remove photographic defects, and is printed on a copper-plate press. When a relief block is required, a reversed negative is used to print from, and the etching is carried to a much greater extent. These processes answer for subjects in black and white, as well as in colors. By printing from the half-tone block twice or more and having the impression slightly off register, beautiful results have been obtained. This is also the system by which conversion of the half-tones of a photograph into an ordinary printing block or plate has become so

Photography

eminently successful. See PHOTOELECTROTYPE: PHOTOGRAVURE.

Photoglyphic Engraving, or Photo-glyptic Engraving, a process of photo-etching invented by Fox Talbot, in which a metal plate, coated with gelatine sensitized with bichromate of potash, is exposed to light under a negative. It is then dusted with finely-powdered copal, and warmed till this is melted. When cold, it is covered with a suitable etching fluid, which soaks through the portions of the film not acted upon by light and attacks the plate underneath.

Photography, the art of catching the images received in a camera obscura on a plate or surface coated with some substance capable of being affected by the action of light, and fixing them in permanent form.

That light can effect chemical or physical changes in many substances is a fact that has been familiar since the days of the alchemists. That some substances are more susceptible to such changes than others is also a matter of common experience.

Consequently, long before the actual discovery of the photographic art, investigators were at work upon the problem of "fixing" images, such as are to be perceived in the camera obscura, or camera lucida. Among substances showing the chemical effects of light may be mentioned bitumen, several salts of silver, iron, copper and platinum, and several chromates.

The effect of light upon bitumen is to render it insoluble to the several oils with which it otherwise readily mixes. Authorities are not agreed as to whether this is to be classed as a chemical or a simple physical change. This property, however, was actually employed by Joseph Niépce in making permanent pictures as early as 1824. Having exposed a surface coated with bitumen in a camera for several hours, he was able to obtain permanent images by dissolving out the unaffected portions in oil of lavender.

A very similar phenomenon is to be observed when gelatine is saturated with a bichromate, preferably of potassium or ammonium. On exposure to light in a camera or under a negative, the areas affected become insoluble and adhere to the backing plate, while the unaffected portions may be readily dissolved away.

The Sensitizer or Absorber.—Photography in all its branches depends fundamentally on the photo-chemical decomposition of a metallic compound in the presence of some readily oxidizable substance, which is known as a *sensitizer* or *absorber*. The metallic compound, undergoing chemical change through the action of light, liberates oxygen or a halogen, which unites with the sensitizer and oxidizes it, thus forming the basis of the photographic image. Although the

chemical composition of those parts of the film which have been affected by the light is thus rendered vastly different from the unaffected parts, the image is still invisible, or, to be exact, the difference in color between the two is so slight as to be generally imperceptible.

Action of the Developer.—To render the image visible, it is necessary to use another substance known as a *developer*. Briefly described, the process of photographic development consists in a chemical redistribution by which pure metallic silver is deposited on the surface of the film, thus making the picture.

The Fixer.—Although after development the photographic image is perfectly visible in non-actinic light, yellow or ruby colored, it quickly disappears on exposure to white light. It is necessary therefore to perform yet another operation, which is that known as *fixing*. In chemical terms, the developed image stands upon a background of unchanged silver haloid, which is still susceptible to the action of light, and must, consequently, be altered or removed before the picture is complete. After the fixing process the plate is thoroughly washed to remove all soluble salts, and the photographic negative is thus completed.

The Sensitive Metallic Compounds.—At the basis of all photographic processes are certain salts of silver, which are of all substances the most susceptible to the chemical action of light. The most sensitive of these is the silver chloride, although the bromide and iodide of silver are also decomposed by light, if in the presence of suitable sensitizers. The effects of light upon silver chloride were first seriously investigated by the famous chemist Scheele as early as 1777. Later, Sir Humphry Davy continued his investigations further, making silver shadow pictures of considerable delicacy by using a solar microscope to condense the image. He missed the glory of discovering the art of photography by failing to apprehend the principle of the sensitizer: hence having no means of fixing the images obtained.

The Processes of Daguerre and Talbot.—Practical photography dates from 1839. On Feb. 21 of that year, Talbot, who had obtained permanent prints and camera images as early as 1835, published his process; Daguerre's was published on Aug. 19. These inventors had been working separately and without knowledge of each other for several years, the former alone, the latter in partnership with Niépce, to whom, apparently, is due the credit of noting the action of iodine on a silver plate, the discovery which led to ultimate success. It is worthy of notice, however, that, although working on different lines and with different material, both Talbot and Daguerre made use of the same metallic haloid, silver iodide, though

producing it in very different ways and obtaining very different results. Although, by a strange chance, Daguerre, rather than Niépce or Talbot, is credited with the discovery of photography, Talbot's process was, in a crude way, more properly the forerunner of present-day methods, anticipating all the essentials now recognized. Daguerre's process, on the other hand, has been entirely abandoned, without even suggesting any of the subsequent developments of the art.

Daguerre's process, to which he had given the name "daguerreotype," consisted in exposing the highly polished surface of a silver plate, or a copper plate coated with silver, to the vapor of iodine. The silver iodine thus formed passed through various colors, depending on the length of the exposure, and experience soon showed the color which had the highest degree of sensitiveness. This, on exposure in the camera, produced no visible image, but on exposing the plate to the vapor of mercury (such small quantity as arose from a temperature of about 140° F.) an image was developed, the mercury vapor having adhered to such parts as had been acted on by light, and in proportion to the quantity or intensity of that light. The image thus formed was of exquisite delicacy, the minuteness of its detail being limited only by the excellence of the lens and the accuracy of the focus. After "development" in mercury vapor the image was fixed by a sodium solution, consisting at first of the chloride, later of the thiosulphate in water.

The principal disadvantage of the original Daguerre process was its slowness. It required a very long exposure of the plate. By an improvement introduced in 1840 by a certain Goddard the silver plate was subjected to the action of bromine vapor, alternately with its treatment by iodine. This reduced the time of exposure to a few seconds. About the same time an improvement hardly less important was made by Fizeau, known as "gilding," the deposition of an extremely fine film of gold on the surface of the plate, which materially added to the beauty and permanence of the image.

Talbot's process, though apparently more complicated than Daguerre's, gave a negative that could be duplicated or multiplied to any extent. Talbot's process ("calotype," he termed it) had paper for its support, and according to his first description was made as follows: A sheet of paper was brushed over with a solution of silver nitrate, dried, and dipped into a solution of potassium iodide, and again dried. This he called "iodized paper"; it was hardly if at all sensitive to light, and would keep indefinitely. To make it sensitive it was brushed over with what he called "gallonitrate of silver," a mixture of solutions of silver nitrate and gallic acid; and after exposure in the camera the image was

developed by brushing over with the same solution and the application of a gentle heat. The image so produced was a "negative"; that is, the lights and shades were reversed, darks in the subject being represented by lights or white paper, and vice versa. The advantage of this lay in the fact that a sheet of the same paper placed under this negative and exposed to light produced a "positive," an image in which the lights and shades were in their natural position. An unlimited number of such positives could be made from each negative, precisely as in present-day photography. But because positives on calotype paper required development, in the same way as the negative, Talbot recommended the use of the silver chloride paper, which required simply exposure to light, or what is now known as "printing-out paper." To facilitate this printing and get rid as far as possible of the grain, he subsequently saturated the paper for negatives with wax. The waxed paper process, although slow, yielded fine results; indeed some of the negatives made then are quite equal to anything since turned out, notwithstanding all the improvements that have followed.

The Albumen Process.—Another notable improvement was made in the albumen process, first proposed by Niépce de St. Victor, a nephew of the original Niépce, but perfected by Le Gray. Iodized albumen was spread on a glass plate and sensitized by immersion in a solution of silver nitrate. It gave results characterized by delicacy of detail unequalled except by the daguerreotype; results so perfect that for certain purposes—such as transparencies for the stereoscope and for enlargements—it has no equal, and, consequently, is still in use.

The practical negative, as known to modern photography, falls into two great classes: (a) plates having a *collodion* vehicle, and (b) plates having a *gelatine* vehicle. These differ considerably in the methods of their preparation, as also in the chemical actions involved and in their practical possibilities.

Collodion is a form of nitrocellulose, pyroxoline or gun cotton, usually the trinitrate or tetra-nitrate of cellulose, dissolved in a mixture of alcohol and ether. It is useful solely as a carrier or vehicle for the active chemicals, presenting the advantages of readily dissolving these; of forming a layer of uniform thickness on the surface of the plate, and after drying—through the evaporation of its solvents—of being unaffected by the chemicals used in developing the image. The typical collodion plate is prepared by coating with a solution of collodion with ammonium or cadmium iodide. When dry the film is sensitized by immersion in silver nitrate. This forms the basis of the so-called "wet-plate" process, largely in vogue with professional

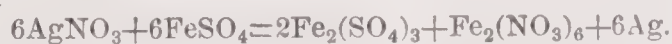
photographers previous to the practical perfection of the gelatine emulsion dry-plate. The action under the influence of light is to form a silver haloid by double decomposition, which is readily absorbed by the silver nitrate sensitizer.

The wet collodion plate, requiring to be prepared and developed on the spot, presented numerous disadvantages for out-door work, since the photographer must carry, not only his camera and plates, but also a full outfit of chemicals, trays, etc., and some form of tent or cover to serve as a "dark room." Thus, very early in the history of practical photography the demand for a "dry" or ready-prepared plate was insistent. The earliest dry plates accordingly appeared about 1861, but had a collodion vehicle, instead of the later-developed and more efficient gelatine emulsion. They were prepared in the same manner as the wet plate, except that, as required by chemical necessity, the free silver nitrate was washed away, leaving the plate but imperfectly sensitized. As a consequence, recourse was had to some soluble organic sensitizer, such as tannin, prepared gelatine, albumen, tea, coffee, malt, etc., which was dissolved and coated on the collodion surface. These sensitizers acted very slowly, requiring from several minutes to a quarter of an hour to complete the exposure. They were, therefore, inefficient for portrait work, and generally inferior as to detail and sharpness of image to the wet collodion plates.

The development of the collodion plate is accomplished by the so-called "acid process," of which the typical formula is as follows:

Iron protosulphate (ferrous sulphate), Fe SO_4	4 oz.
Acetic acid, $\text{C}_2\text{H}_4\text{O}_2$	4 oz.
Methylated spirit, $6 (\text{C}_2\text{H}_6\text{O}) + \text{CH}_4\text{O}$	3 oz.
Water.....	63oz.

The alcohol is introduced largely to insure uniformity of flow over the surface of the negative, the active ingredient being the ferrous sulphate, which reduces the silver nitrate, giving rise to a reaction and forming by decomposition three new substances: sulphate of iron (ferric sulphate), ferric nitrate, and metallic silver, according to the equation:



The free metallic silver is deposited on the portions of the plate affected by light, thus bringing up the invisible picture, while the other compounds are retained in solution. This result is furthered by the action of the acetic acid, whose function is described as that of a "restrainer." Retarding the precipitation of the silver, it insures its deposit only on the photo-decomposed areas, in strict proportion to the degree of light-effect, or decomposition, at every point, and building up the picture in relief, in height proportional to the amount of silver present in the solution.

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When the development is completed, as evidenced by detail and density, then apparent, the plate is thoroughly washed in water, and is then ready for the fixing solution. When the density of the shades is not sufficiently great—which is to say, when the light-affected areas are not dark enough to permit of successful printing—the plate may be redeveloped, or *intensified*, in a bath, of which a typical formula is as follows:

Pyrogalllic acid, $C_6H_3(OH)_3$	10 gr.
Citric acid, $C_6H_8O_7$	25 gr.
Silver nitrate solution, $AgNO_3 + Aq$	20 gr.
Water	2 oz.

The effect of this solution is to continue the building-up of the negative image to the required density.

To the point at which the development of the negative is completed the process has been concerned solely with its light-affected areas, and not at all with those areas unaffected by light, which is to say the deeper shades and blacks of the photographed object, which should appear translucent in the finished plate. This fact is evidenced by treating the developed plate with dilute nitric acid, which dissolves off the picture, leaving the film blank, as before exposure.

The Fixing Solution.—The plate is next immersed in the *fixing solution*, which performs its function by reducing and removing the silver iodide in the unaffected portions of the film. Among *fixers* used in the early days of collodion plate photography were solutions of the chlorides of ammonium (NH_4Cl), potassium (KCl), or sodium ($NaCl$), which formed soluble double salts with the silver haloids, thus removing them from the film. Their action was, however, liable to be imperfect, with the result that considerable portions of the haloids remained undissolved. Potassium cyanide (KCN) was also used at a later stage, performing its work by producing a double cyanide of silver and potassium ($AgK(CN)_2$), extremely soluble in water, with a residuum of potassium bromide (KBr). The nearly universal fixer at present in use is the sodium thiosulphate ($Na_2S_2O_3$), or hyposulphite of soda, which forms the highly soluble thiosulphate of sodium and silver ($Ag_2Na_4(S_2O_3)_3$), with a residuum of sodium bromide ($NaBr$). The general formula prescribes one part of the “hypo.” to forty parts of water. When the action is complete, the excess salts are removed by thorough washing. The plate, after drying, is then complete, and ready for printing.

Ambrotypes and Ferrotypes.—The collodion process formed the basis of two very interesting varieties of photograph formerly extremely popular. These are the *ambrotype*, as it was called in the United States, and the *ferrotype*, or “tintype.” Both use a negative, or directly photographed, image as the finished picture, and admit of no multiplication by printing. In

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the ambrotype, the glass negative is finished in the manner above described, and then backed on the film side with a black card. The lights or white portions of the picture—such as the face of a portrait, white clothing, etc.—then appear in the opaque white of the developed film, the shades—background, dark clothing, deep grays, etc.—being supplied by the dark background where the unaffected film has been eaten away by the “fixing” solution. In this manner the lights and shades are perfectly reproduced as in nature. Such pictures mounted in leather plush-lined cases, after the style of daguerreotypes, were very popular in the “sixties,” being only gradually supplanted by the small paper positive photograph or *carte-de-visite*, and the less elaborate ferrotype. The latter style of photograph consisted simply in an iron plate coated with a black varnish as protection against acid corrosion, and having a collodion film formed on one face. The preparation and development of the film were in all respects precisely like those followed in the case of glass collodion plates. As in the ambrotype, the light-affected portions showed white against the black background, the unaffected areas being similarly eaten away, and showing in black and gray.

At the present time the collodion plate is almost universally disused, because of the immense superiority of those prepared with an emulsion film, generally of gelatine. Although the preparation of this variety of plate is much more complicated, its manufacture is always conducted on a large scale in well-equipped laboratories, and the finished products ready for use in any desired sizes and degrees of sensitiveness, or rapidity of action, are supplied to the photographer in quantities.

The Gelatine Emulsion Plate.—An emulsion plate is prepared by precipitating a silver haloid—typically the bromide—in a finely divided state into the gelatine vehicle, and then coating the glass plate, which, after drying, is ready for use. Various investigators previous to 1878 had experimented with gelatine films, but with indifferent success. The problem was finally solved by Bennett of London, who in that year announced his discovery that the sensitiveness of the gelatine emulsion may be very greatly increased by digesting at $90^\circ F$. This discovery laid the foundation for the efficient gelatine emulsion plate in all the numerous forms and varieties under which it appears at the present day. But, even with the knowledge thus imparted, great care must be taken to secure the proper gelatine for the particular process to be employed. The presence of excess acid or fatty matters is a serious consideration.

Ripening the Emulsion.—Upon Bennett’s discovery is based the process known as

"ripening" the emulsion by boiling it for a considerable period. The action thereby produced is probably, in large measure, a change in molecular construction, which modifies the physical reactions, including the realization of a greater sensitiveness to light, and, as some have contended, gives rise to an actual compound between the haloid and the gelatine, or with some of its ingredients.

Preparing the Emulsion.—A typical process consists in making a solution in pure water of the iodide of ammonium (NH_4I) or iodide of potassium (KI), with a suitable gelatine, and gradually adding a solution of silver nitrate with constant agitation to promote its distribution throughout the entire solution. In this process it is necessary to avoid any excess of the silver nitrate, as success depends on having it finely divided throughout. The emulsion thus produced is then thoroughly boiled for a half hour or more, which constitutes the "ripening," as before explained. When cooled, the semi-solid emulsion is washed in cold water, being squeezed through canvas, to subdivide it as far as possible. This bath removes all soluble salts produced by decomposition and all excess of the haloid. The required consistency is then obtained by adding an additional quantity of gelatine, and after filtration the compound is ready to be spread on a glass plate.

The development of the gelatine negative is attained by a process described as "alkaline," as distinguished from the acid developer used with the collodion plate. This form of development is also known as the *reductional* or *chemical*, from the fact that its distinguishing feature is the supply of the silver required from the image by the reduction of the haloid salt formed in the gelatine film itself, as the result of exposure to light. The developing agent is an alkaline or neutral solution of some reducing agent, preferably some readily oxidizable organic compound. Such an agent as the ferrous sulphate of the acid developer is of no use, since it lacks the power to reduce the silver haloids apart from the presence and reactions of silver nitrate in an acid solution. Among alkaline developers are the trihydro-oxybenzene, pyrogallol or "pyrogallie acid" ($\text{C}_6\text{H}_3(\text{OH})_3$); a di-oxybenzene, known as quinol or hydroquinone ($\text{C}_6\text{H}_4(\text{OH})_2$); an oxy-ammonia, known as hydroxylamine (NH_2OH); a di-amido-phenol salt, known as *amidol* ($((\text{OH})\text{C}_6\text{H}_3(\text{NH}_2\text{HCl}_2))$); a monomethyl-amidophenol, known as *metol* ($((\text{OH}.\text{C}_6\text{H}_4.\text{NHCH}_3)_2\text{H}_2\text{SO}_4)$); a soda salt of an amido-naphthol sulphur acid, known as *eikonogen* ($\text{C}_{10}\text{H}_5\text{NH}_2\text{ONaHSO}_3 + \text{Aq}$); a parahydroxyglycin, known as *glycin* or *glyocol* ($\text{CH}_2(\text{NH}_2) - \text{CO.OH}$).

These substances differ widely in quickness of operation, but each one presents some particular advantage which is largely

emphasized in certain quarters. Thus metol has been classed as a quick-acting developer, and glycin as a slow one. Formulas combining the two have been published. A typical pyrogallie developer consisting of two solutions is as follows:

Solution 1.

Pyrogallol	22 gr.
Metol.....	18 "
Sodium Sulphite, Na_2SO_3	360 "
Water	8 oz.

Solution 2.

Potassium Carbonate, K_2CO_3	1 oz.
Water	8 oz.

For normal exposures a combination of the two is recommended; one part each of A and B and one part of water.

The Alkaline Developer.—The developing agent acts directly to reduce the photo-reduction product, replacing it by its equivalent of metallic silver. At the same time reduction takes place in the unaltered haloid adjacent to the nascent silver thus generated. Contrary to the rule observed in the development of a collodion plate, the image grows by the continuous reduction of silver haloid downwards, which occasions the phenomenon of the developing image visible only from the back of the plate. Unlike the collodion plate, again, the image may not be dissolved off, leaving the surface of the film clean as before exposure, but, if removed by acid, a sunken cast remains in the gelatine. Since the developers used in this process are all strong reducers, capable of directly reducing the silver haloid of the film, an ingredient known as the "restrainer" is added. The most suitable substance for this purpose is potassium bromide, which moderates the reducing action of the developer by forming a double bromide of silver and potassium, a compound much more stable than the silver salt alone. For the same reason some gelatine films contain a small portion of potassium bichromate, which acts to reduce the solubility of the light-affected areas of the gelatine.

Intensifying.—The gelatine negative may be intensified, or "redeveloped," when necessary, just as the collodion. Owing to the wide divergence in the processes, however, the result in this case is accomplished in a very different manner. Briefly described, the process consists in substituting for the silver some denser metallic deposit, preferably a compound of mercury and silver, the mercury in the form of its bichloride (HgCl_2). A practical formula recommends:

Mercuric chloride.....	1 oz
Water	20 oz.

The action of this solution results in producing a mixture of silver and mercurous chlorides, according to the equation:



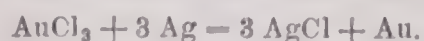
By treating again with a solution of

potassio-ferrous oxalate ($4\text{FeC}_2\text{O}_4 + 2\text{K}_2\text{C}_2\text{O}_4$), the chlorides are replaced by the metallic silver and mercury, which combine to form a denser image on the plate. Similarly, when too dense an image appears, the metallic silver may be partially removed with some substance capable of forming a combination soluble in sodium thiosulphate, or other convenient solvent. The final *fixing* of a gelatine plate is performed by a thiosulphate solution as in the collodion process. In both cases the action is the same.

Celluloid Films.—Great advances have been made in photography through the perfection of the celluloid film negative. Gelatine emulsion may be coated upon a sheet of transparent celluloid in the same manner as upon glass or paper, and may be used either in the form of rolls, or as single films cut to a certain size, just as are glass negatives, and exposed either in a holder or in "packs." The celluloid film presents the double advantage of small weight and compactness, as compared with glass; may be developed in precisely the same manner, and is quite as durable.

Photographic Paper.—There are two general varieties of photographic printing paper: (a) printing-out paper, in which the image appears at once on exposure to light under a negative, requiring only to be toned and fixed, and (b) developing paper, in which the image does not immediately appear, but requires developing like the negative, and subject to many of the same conditions as the negative plate. Such papers are, in general, compounded with silver bromide, and known as bromide papers.

Silver Papers.—One of the best known printing papers is the so-called silver albumen paper. It is formed by a coating of albumen solution containing ammonium chloride, upon which, when dried, is floated a solution of silver nitrate. Under the negative the image appears immediately, and printing may be continued until the required depth of color is obtained. The image, being light-developed, needs only to be toned, or brought to the desired color, and fixed. The color of the image, as produced by light, is decidedly reddish, being a reduction product composed of silver chloride and the organic compound with the silver salt. The process of toning is effected by a solution of auric chloride (AuCl_3), which, by reaction with the products of photo-decomposition, forms silver chloride, releasing the gold, and enabling the formation of a deposit of metallic gold upon the light-affected areas of the paper surface, according to the following equation:



The gold chloride solution is kept neutral by the addition of chalk, borax, or the acetate, carbonate or phosphate of sodium—

sometimes also the chloride of sodium—whose function it is to prevent the formation of hydrochloric acid. Acid in the solution retards the deposit of gold and prevents the production of a good tone. On the completion of the toning process the print is fixed by immersion in the "hypo" solution, which, as in the case of the negative, performs its function by dissolving out the unaltered silver chloride.

While the silver printing paper is not so widely used as formerly for finished photographs, it is often used for sample "proof" portraits, which are submitted as samples by photographers in untuned and unfixed condition. For finished work photographers generally prefer other varieties, which permit of effects difficult to achieve with the silver-albumen process, and are also more durable.

Bromide Papers.—More permanent results may be achieved by the bromide process, using paper coated with an emulsion of silver bromide and gelatine. This variety of paper is extremely sensitive and, in general, gives its best results in artificial light. For enlargement work the bromide process is the one most commonly in use, either with paper or glass coated with emulsion. For the usual contact work several variations of bromide-gelatine emulsion paper have been produced, most of them containing other ingredients, according to some secret formulæ. Such papers are known by the trade names of "Velox," "Cyko," "Argo," etc., and possess the common traits of great sensitiveness, requiring only momentary exposures, and of an invisible image to be brought up by a process of development.

Bromide papers are developed in water solutions containing potassium oxalate ($\text{C}_2\text{K}_2\text{O}_4$); ferrous sulphate (FeSO_4); potassium bromide (KBr), with a small quantity of acetic acid ($\text{C}_2\text{H}_4\text{O}_2$). For certain special papers of this class the developer consists of metol or hydroquinone, sodium sulphite (Na_2SO_3), and sodium carbonate (Na_2CO_3), with small quantities of potassium bromide.

Salts other than those of silver have been used successfully in printing papers, notably, salts of platinum, uranium and iron.

Platinum Papers.—The platinum process, introduced by W. Willis of London, gives richer and also more permanent results than are possible with silver salts. The image, composed of finely divided platinum, is obtained by the reaction of ferric oxalate ($\text{Fe}_2(\text{C}_2\text{O}_4)_3$) and potassium chloroplatinate (A_2PtCl_4) in a solution of potassium oxalate ($\text{C}_2\text{K}_2\text{O}_4$), producing, as the result of the final combinations, a mixture of ferric oxalate, ferric chloride (Fe_2Cl_6), potassium chloride (KCl), and precipitating metallic platinum. According to the most

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recent modification of the process, a solution of

Ferric oxalate	4.2 parts
Potassium chloroplatinate	4.2 parts
Water	30 parts

is floated upon the surface of the paper. After exposure in the printing frame, which is much shorter than with silver paper, the print, showing a faint image, is immersed in the developer.

Hot Development of Platinum Prints.—Platinum papers may be developed by use of either a hot or a cold solution. The active ingredient in the hot method is potassium oxalate, but other ingredients, not specified, are also included in the cold developer. For the hot development, the paper is printed until the highest lights only are visible, in a yellowish-black tone and development next conducted in a weak white light or by artificial light. The solution, made by dissolving one pound of potassium oxalate in fifty-four ounces of water, is kept heated by a Bunsen burner during development, the temperature being kept at 140° F. After the image has appeared to the desired tone, the print is fixed in three successive baths of muriatic acid in weak solutions, and after remaining in each bath for some ten minutes (at least fifteen in the third bath in some cases), it is removed and washed in three changes of water for about a quarter of an hour.

Cold Development of Platinum Prints.—The cold method employs a secret developing solution which is used in connection with a platinum salt, the paper or print being removed to a weak muriatic acid solution when developed to the required tones, and finally washed in cold water. In both methods, the solutions are necessarily fresh for each batch of prints, as old solutions give stained or streaky effects. The nature of the sensitizing coating is such that moisture is readily absorbed by the paper, and as this is ruinous to the tones of black or sepia, a lump of calcium chloride is kept with all undeveloped paper.

Blue Print Paper.—The cyanotype process—otherwise known as the Blue Print Process, was discovered by Sir John Herschel, sometime previous to 1851. In its best-known form it gives a blue ground with white or tinted-white lines on the finished print, and has changed but little in chemical composition since the time of Herschel. Its great popularity is due to its ease in manipulation, the permanence of its prints and the inexpensiveness of the chemicals both in the manufacture of the sensitizing and of the fixing solutions, the latter being water only. The cyanotype is used mostly for photo reproduction of mechanical and architectural designs.

In the original form, the blank paper was washed over with a solution of ferric ammonium citrate, or ammonio-citrate of iron

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($\text{Fe}_2(\text{NH}_4)_2(\text{C}_6\text{H}_5\text{O}_7)_3$), dried and stored for some time and then exposed to light under the negative. The yellow color of the treated paper changed to brown on the parts exposed to light, when the print was washed to remove the yellow. Next, the print was treated in a strong solution of potassium-ferricyanide or red prussiate of potash (K_3FeCy_6), when the unexposed portions changed over to a blue color, hence the name "blue print." The image was strengthened by treating with a solution of sodium-carbonate (Na_2CO_3), and finally by washing in water.

In the modern blue-print, the iron and prussiate solutions are combined to make the sensitizing solution, as follows:

A—Ammonio-citrate of iron.....	4 oz.
Water.....	14 oz.
B—Potassium ferricyanide.....	2½ oz.
Water.....	15 oz.

Equal parts of A and B are mixed and filtered, the paper being coated and quickly dried. The dry print will have a yellowish tone, which turns bluish under the action of light. On washing in water and drying, the image shows as white on a blue ground.

White, Black and Brown Cyanotype Processes.—While the blue print is the most used of the Cyanotypes, there are other forms used in copying plans, drawings, etc., and rarely found in amateur or studio work. Thus, it has been found desirable to have the ground white and the image colored, so that figures, etc., are the more readily distinguishable. This demand led to the introduction of the "white print," "brown print" and "black print," all of which are used in the trades to-day. The white print, in which the image itself was blue and the ground white, was invented by Pellet, whose formula with modifications is used at present, and is here given:

Iron perchloride, FeCl_2	616 gr.
Oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$	308 gr.
Water.....	14 oz.

The paper is brushed over with this solution, dried and printed and washed with a saturated solution of potassium ferricyanide, rinsed in water and fixed in a 3 per cent. sulphuric acid solution. The modern white print uses a solution of the ferricyanide in an acid, the latter varying with the maker of each paper.

When a print has to be photographed, as would be the case where the original was not at hand, neither the blue print nor the white print are of use, owing to their color. The regular blue print may be used by treating with a solution which gives a black or brown finished print, or specially-coated paper embodying similar solutions are used. The image in both cases is a positive, giving black or brown lines on a white ground, and these colors will photograph, or when the paper is thin enough can be used to make other reversed positives.

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For the black print, using the ordinary blue print paper, after printing, the paper is developed in the following solution:

Gallic acid, $C_7H_6O_5$	1 oz.
Citric acid, $C_6H_8O_7$	1 oz.
Alum.....	8 oz.

taking $1\frac{1}{4}$ ounces of this solution to a gallon of water. The print should be kept in the solution until the lines are black or brown and are finally washed in cold water.

The extent to which the color of a blue print before the final washing can be changed is not widely known, but very beautiful effects may be obtained by immersing in baths of various chemicals or by local treatment with brushes to get several colors on one print. Thus, by treating with a solution of uranium nitrate, a blood red or brown-red color may be obtained; by washing in weak ammonium-nitrate, a greenish lavender tone of short life, while by treating with gallic or tannic acid various brown tones appear. In this respect, the blue print can be varied more than any other print at present in use.

Bichromate Processes.—In addition to the processes depending upon chemical reactions for producing the image, there are numerous others depending in general upon the light-changes effected in bichromatized gelatine. These may be broadly classified into (a) pigment prints, and (b) ink prints, as we may term them, the latter affording means of obtaining surfaces in relief from which proofs in printer's ink may be obtained.

Pigment Prints.—The typical pigment print is the so-called carbon photograph, which consists primarily of a coating of bichromatized gelatine mixed with carbon or other coloring matter. The coating on exposure to light under a negative is affected in the usual manner, the gelatine becoming insoluble in the light-affected portions, in proportion to the amount of light falling upon its surface. Thus, where the greatest amount of light affects it, it is entirely insoluble, in the half-lights, or various shades of gray, it is only partially insoluble, in strict ratio to the degrees of light and shade, and, where no light has struck it, in areas corresponding to the black parts of the negative, or the white parts of the positive, it may be readily dissolved away, taking its charge of coloring matter with it. The pigment mingled with the gelatine must be carefully proportioned, in order that a perfectly black color will appear only in the areas receiving the greatest amount of light, and that the color may be seen as gray wherever any lesser illumination has affected the film.

Mechanical Processes.—Among processes using a surface for printing with ink may be mentioned the Woodbury-type and

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the Collotype, each of which has several variants. There are other processes for obtaining a printing surface, either by the use of gelatine or of bitumen. Among the latter may be mentioned the photogravure.

The Woodbury Process.—A film of gelatine, mixed with potassium bichromate, is exposed under a negative and then treated with warm water. A relief surface is thus obtained on the gelatine film, which, after drying, is laid face up upon a perfectly plane polished steel plate. Another smooth plate, composed of a type metal mixture, is laid upon the face of the gelatine relief surface, and, being subjected to a pressure of several tons in an hydraulic press, receives an impression of the relief film. An intaglio is thus produced from which proofs may be taken on paper, after the general manner of engravings and other intaglio processes with an "ink" consisting of a mixture of gelatine and india ink. As in the carbon print, above described, the depth of color depends strictly upon the actual relief of the gelatine surface, and very beautiful effects may be obtained.

The collotype process depends upon the changed chemical affinity of the light-affected bichromatized gelatine, the preparation consisting in obtaining a perfectly plane surface of varying absorption qualities, and printing from it after the manner of a lithographic stone, upon which a picture has been drawn in grease ink. After exposure under a negative, the gelatine is treated in a bath to remove the bichromate from the areas unaffected by light, and, after drying, is ready for printing. The unaffected portions have a strong affinity for water, while the affected portions, though largely impervious to water readily absorb greasy ink. By proper drying the gelatine surface shows a marked granular character, which is apparent in the print under a magnifying glass. Printing ink rolled over the surface is thus absorbed by the light-affected areas, in proportion to the amount of light that has fallen upon them, and, as a consequence, proofs on paper will show all the gradations of light and shade, as perfectly as a photographic print resulting from chemical reactions in photo-sensitive salts.

Apparatus.—The apparatus of photography are familiar to most intelligent persons. The sensitized film is exposed to the light at the rear end of a light-tight box, known as the *camera* into which the light is admitted solely through a glass *lens*. The principal requirement, then, is to secure a good focus, which is to say to adjust the relative distance of lens and sensitized plate, so as to secure a sharp and distinct picture. For this purpose an extensible accordion-like structure, known as the "bellows," is usually employed. In some cameras it achieves the proper focal dis-

tance by enabling the lens to be moved forward, in others by enabling the plate to be moved backward. In large cameras a plate of ground glass set in a frame receives the reflected image, enabling the operator to judge the accuracy of the focus. In smaller cameras, particularly those intended for amateur use, the proper positions of the lens for objects at known distances are indicated on a graded scale.

The Lens.—The lens is the all-important element of the apparatus, since upon its fitness in any particular condition depends all that goes to make a good photograph. In this connection must be recognized, not only that the lens must be of the particular shape and dimensions suited for the case in hand, but also that it is free of the numerous defects which experience has found in lenses in general.

Classes of Lens.—There are two classes: (a) the convex, or converging, and (b) the concave, or diverging. Each class contains three varieties. In the first, or convex, class, we have: (1) the double convex, (2) the plano-convex, and (3) the converging meniscus, the last a concavo-convex lens, having the flatter arc on the concave face, so as to differ but slightly from a plano-convex. In the second, or concave, class, we have: (1) the double concave, (2) the plano-concave, and (3) the diverging meniscus, the last a concavo-convex lens having the flatter arc on the convex face, so as to differ slightly from the plano-concave. The two classes of lens differ considerably in the laws governing the formation of the foci, and in other optical qualities. Briefly, the convex lenses magnify objects and the concave reduce them. The former are called converging lenses because rays diverging from any axis will, after passing through them, tend to converge at a point beyond on that same axis. With the concave lenses, on the other hand, light rays tend to increase their divergence, and do not converge at a point. Because their qualities are thus opposite, it is customary to use combinations of two or three lenses to form photographic *objectives*, in order that one lens may neutralize the optical deficiencies of the others. It is customary also to make the lenses of such compounds of different varieties of glass, generally of those known as “flint” and “crown” glass, respectively, since the refractive qualities of a lens differ, not only with its shape, but also with the quality of its glass.

Lens Troubles.—These are altogether faults relative to their photographic use, without reference to any inaccuracies in their shapes or impurities in their glass. They are known, in general, as “aberrations.” The following are the more usual:

Spherical Aberration is the tendency of the rays passing through the margin of the lens to converge at a focal point different

from that of the rays passing through the center. This defect is due to the spherical shape of the lens surface, and increases with it. It may be remedied in several ways: (a) A diaphragm set in front will act to form the image entirely of rays passing through the central area of the lens. The best form of lens in this condition is the plano-convex, since it permits the use of a large diaphragm aperture, thus permitting a wide angle of view and rapidity of photographic action. (b) The more usual method is to combine the lens with another of contrary optical character—a divergent with a convergent—thus permitting the one to correct the shortcomings of the other. Such a combination may be one of the two varieties of meniscus, of a double convex and a double concave, of a double convex and meniscus, etc., according to the use, whether for portrait or view work.

Chromatic Aberration is the tendency of certain color rays to be brought to a focus at points different from other color rays, thus interfering with the best results, particularly when an object containing several colors is to be photographed. It results also from the fact that the focus of the visual image on the ground glass screen may not be the true *chemical focus*, or point at which active rays exert their highest chemical effects. This chromatic aberration is particularly pronounced with the red and violet rays, the first generally having its focus nearer the lens than the visual focus, having a small refraction index (1.5258), and the other further from it, having a larger refraction index (1.5466). Such differences are apparent even with a two-lens combination, unless the lenses be of different kinds of glass, which have different powers of refraction and dispersion, so that, with the proper proportioning of the lenses, all color rays may be perfectly focused on one plane. Thus is an *achromatic* objective produced. In such lens combinations the converging lens is of crown glass, and the diverging lens of flint glass.

By properly calculating the lens combinations the familiar effects of *abnormal curvature* may be corrected. Such effects are seen in attempting to photograph the straight bank of a river with an ordinary wide-angle lens; it appears in the picture as an arc, instead of a straight line. A similar rule applies to the *flatness* of effect in portrait work.

Other orders of distortion, due principally to attempted use of a lens for angles and distances other than those for which it was calculated, may be seen in the appearance of a rectangular building with convex or concave wall lines. The former distortion is known as the “barrel-shaped,” the latter as the “pin cushion.” Such effects may be neutralized by properly placing the diaphragm with relation to the

lenses. When one lens combination is used the diaphragm may be placed before or behind the lens, as experiment or directions indicate. With "doublets"—two lens combinations in a tube—the position for the diaphragm is between the two lenses, so that their distortive tendencies neutralize one another. The closer the diaphragm is to the lens, permitting most rays to pass through the center, the greater the immunity from distortion thereby ensured.

Lenses for landscape work may be simple or "doublets." "Triplets"—three lens combinations, set on one axis in a tube—are now seldom used. The simple combinations, in general, consist of two, sometimes three, meniscus lenses, occasionally also the equivalent in form of a double concave with a double convex, the concave faces being, as a rule, toward the object.

In general, with view lenses the flatter the face, the quicker the action, because a larger diaphragm aperture may be used. With deeper curves the diaphragm may be set farther back, thus allowing a wider angle and less distortion.

View lens doublets are usually single or double meniscus lenses, set with their concave faces opposite and their convex faces pointing, the one toward the object, the other toward the picture plate. Various combinations and variations have been introduced, with as many claimed advantages for special purposes.

Portrait lenses are always doublets, on account of the involved requirements of rapidity and sharpness. Because normally to be used with diffused light, the diaphragm aperture may be large, although the angle of view is a small one.

Portrait lens doublets consist generally of two double convex lenses, the rear one in combination with a divergent meniscus, sometimes of greater inward curvature than its bi-convex fellow; the front one in combination with a double convex, or nearly plano convex lens cemented to its inner face. Other portrait objectives have a double meniscus at the back, and a bi-convex-bi-concave combination at the front. Numerous variations are in use; some makers using three-lens combinations for one or both lenses of the doublet; others using one and two-lens combinations, respectively at rear and front. In portrait lenses the diaphragm is an essential feature, the opening being always susceptible of adjustment to suit given conditions of light and required rapidity of operation.

Light in Photography.—Light is all-important in photography, particularly in close-range and indoor work. For the photographing of views the best light is that reflected from the rear of the operator, except where a glare from water or snow is liable to be excessive. In such cases better results may be obtained on a slightly cloudy day, or when the sun is just below the horizon.

This rule is observed in photographing lofty snow-capped mountains. The noon sun affords a splendid light for views, with the proper adjustment of the diaphragm. In general, in strong light, the aperture of the diaphragm should be reduced for time exposures, but may be opened wide for instantaneous work. Experiment, or the observance of directions for the use of special lenses, will always determine action in this matter.

For near views, particularly of groups of persons, where distinctness in the faces is requisite, particular care is required in the arrangement of the light. In general, the mid-day light is preferable, since the faces may be suitably illuminated, without painful glare in the eyes. A front light is good when hats are worn, particularly lights at large angles from the plane of the group. In focusing, care should be taken to avoid any decided shades on the faces, as these are liable to photograph black, and spoil the portraits. Faces should not be directly illuminated, as the skin, clothing, etc., reflects often too much. Groups may be photographed under cover, provided that a good strong diffused light is possible. The worst cover, however, is a tree or arbor, since even the lightest shadows of leaves, etc., on the faces photograph in dark tones.

The studio is the ideal place for portraiture, since, by the use of skylights with ground or whitened panes, and adjustable shades, a diffused light of any required degree of intensity or obscurity may be obtained. In diffused light a wide aperture of diaphragm may be used, thus admitting a greater amount of light to the sensitized plate, and ensuring rapidity of action.

Photographs may be taken by artificial light of sufficient intensity, such as is furnished by the electric arc, the oxy-hydrogen burner or the Nernst incandescent lamp. Artificial light is, in fact, the rule with enlargement work, as also with several varieties of extra-sensitive printing paper.

The Magnesium Flashlight.—Prior to the use of steady burning light, artificial illumination of the subject was by the "flashlight," where a quantity of lycopodium or magnesium powder was burned in a suitable receptacle. This is still used in places where illumination is insufficient for a rapid exposure, or where the lights are not proper for a good photograph. The suitability of the light emitted by burning magnesium for photographic purposes was first shown by Professor Roscoe in 1864, although the phenomena of its burning were observed by Sir Humphry Davy, the discoverer of the metal, in 1808. A. Brothers, of London, took the first out-of-doors flashlight photograph in the same year, the subject being that of the interior of a mine in Derbyshire. The employment of magnesium to any extent in this direction was inconsiderable until the introduction of the modern dry-

Photography

plate process, when with the vast increase in photographic work and processes by both amateur and professional, the employment of flashlights for exposure became so common for both classes that at the present time, except for portraiture and process work, they are universally used where daylight cannot be depended upon for a quick exposure. By magnesium light, hitherto unobtainable photographs of banquets, crowds at night, etc., can be made in a short time and with the excellent developing and fixing processes in use, copies are available within an hour's time from the instant of exposure. The relative instantaneousness of the exposure by flashlight, also, enables objects in motion to be caught quite as well as in the light of day.

The flashlight of the present day is of the metal magnesium in the form of a ribbon, sheet or in powder contained in a receptacle. In the first two forms it is ignited by a match or an electric spark, while in the latter form, ignition is by fuse or spark. The ribbon and powder forms are used commercially, the quantity being governed by the size of the object to be photographed. For amateur use, the powder comes in small wood boxes containing sufficient for large or ordinary rooms. The sheet form is a paper saturated with magnesium and is generally used for amateur and portrait work. The employment methods are practically the same for all forms, and are here given:

The flashlight powder, either in its box or in its lamp, is placed to one side or slightly in rear of the camera ready to ignite, two or more flashes being often used simultaneously. The shutter of the camera is then opened, the camera focussed and any lights which shine into the lens extinguished or shaded, the others being left on. The plate or films being put in position, the flashlight is ignited and the shutter immediately closed, the exposure being completed an instant after the "flash." The procedure is thereafter the same as when a photograph is taken in daylight. When a subsequent exposure by flashlight is to be made, unless the resulting smoke from the burned magnesium be collected in a white cloth bag or other device, time must be given to allow the smoke to dissipate, as it has a clouding effect on the next picture. The bags used in making commercial flashlights are of treated white cotton, which allows the light to penetrate, but which holds the smoke for some time, gradually permitting it to filter through the meshes of the cloth and dissipate rapidly in the air. They are generally used for inferior work only.

The chief objection to the use of the magnesium flashlight is the strained and unnatural look of the faces, when portraits or groups are taken, but this is the result

Photography

of inexperience or carelessness on the part of the operator. With a totally dark room, the usual conditions in amateur work, the strong and sudden light of the flash, causes a dilation of the pupils of the sitter's eyes and too often the accompanying dropping of the jaw, and these results are only too frequently seen in the unconscious caricatures in the collection of every amateur. If, however, any lights not shining into the lens of the camera be left burning, the contrast of light is never so great and a natural expression of countenance is the result. Mirrors, eyeglasses, and other objects which cause reflections should be covered or removed, as otherwise the photograph would be fogged locally. In taking flashlights of inanimate objects, the same conditions of lighting prior to and during the exposure tend to neutralize reflections, which would otherwise be quite noticeable when the flash was set off in a dark room. The subsequent treatment of the negative in developing, etc., is the same as that of an instantaneous exposure in daylight.

The applications of photography are many and varied; in fact, photography has become essential to the making of books, newspapers, magazines and educational apparatus of all kinds, to medicine, art, the applied sciences, law, astronomy, in military and naval service, and in chemistry. Its application to the publishing interests lies in the adaption of the various reproduction processes, giving "half-tone," and line, effects, lithographs, or the older "lichtdruck" or "heliotypes," etc., for delineating diagrams, plans, scenes from photographs taken many miles away, portraits, and the like. The making of lantern-slides, in which a transparent positive is made from a glass negative for use in stereopticon lanterns, etc. In art, we have the same as in printing, and even photography is often employed to give the groundwork for the painting, especially where fabric is used. In astronomy, photography records the stars, etc., seen through the telescope, gives color values to the spectra of stars, and is of general service as well. In law, the reproductions of documents, scenes, etc., furnish valuable evidence in the settlement of cases.

In biology and chemistry, what is known as "photomicrography" or the enlarged reproduction of small objects is employed, with apparatus similar to that used for ordinary work, but on a reduced scale. It is of invaluable importance, in giving true views of objects, which might otherwise be viewed wrongly, if the services of a draughtsman only are employed, and with orthochromatic (or light-valuing) plates different color values or luminosities will be shown. In medicine, the camera is used with special plates for examination with the Röntgen or X-rays, or for reproducing from the emanations of

Photogravure

radium or other radio-active substances. In military and naval services, views are taken from aeroplanes, balloons, kites, etc., or even portraits and scenes on the field.

J. E. HOMANS.

Photogravure, a term applied to methods of producing, by photography, plates for printing in a copperplate press. The processes are kept secret; but, in one of them, the translation of photographic half tones into the corresponding grain required for printing, is said to be effected by the aid of a substance which crystallizes when exposed to light, the size of the crystals depending upon the amount of light they receive. Such a substance, exposed under a negative, will give a surface, the grain of which will exactly correspond with the lights and shades of the picture, and from which an electrotpe can be made for printing purposes.

Photoheliograph, an instrument for photographing the sun. It takes different forms, according to the purpose for which the photographs are desired. The simplest is a telescope mounted equatorially with a camera at the end instead of an eye piece, and generally with what is called a secondary magnifier at some distance inside the focal plane, for the purpose of giving an enlarged image of the sun on the plate. The horizontal photoheliograph is another form, in which the telescope is horizontal and fixed in the meridian; the rays of the sun being reflected to the object glass from some form of heliostat mirror. In this plan the enlarged image is obtained by making the telescope of great focal length, there being no limits upon this, as it is fixed and horizontal. This was the pattern used by the American parties for photographing the two transits of Venus in 1874 and 1882 and it is capable of a much higher degree of precision than any other form of the instrument.

Photolithography, a mode of producing by photographic means designs upon stones, from which impressions may be obtained in the ordinary lithographic press. A sheet of suitable paper is coated with gelatine containing bichromate of potash, and exposed under a negative. The surface is then inked with lithographic transfer ink. The paper is next floated face upward, in hot water, till the unaltered gelatine swells; then the superfluous ink, and the soluble gelatine are removed by gentle sponging with hot water. The resultant image is transferred to stone and printed by LITHOGRAPHY (*q. v.*). There are other methods: In some the stone itself is coated with sensitive gelatine; or an exposed sheet of paper, coated with gum arabic and bichromate of potash may be damped and transferred to the stone at

Phrygia

once. The gum not rendered insoluble by the action of light adheres to the stone. The ink subsequently applied only adheres where there is no gum.

Photosculpture, a process for producing statuettes by the aid of photography, invented by M. Villème, a French sculptor. The model stands, in a studio of special construction, in the center of a circle of 24 cameras, by all of which he is photographed at the same moment. The 24 negatives are then projected in succession on a screen by means of an optical lantern, and the artist goes over the outline of each with the tracer of a pantagraph, a cutting tool acting upon a lump of modeling clay, mounted upon a turn-table, being substituted for the usual pencil. After each photograph is gone over, the clay is turned through 15°, and when a complete revolution has been effected, it is removed and finished by hand.

Phrenology, the science or doctrine which teaches that a relation exists between the several faculties of the human mind and particular portions of the brain, the latter being the organs through which the former act. That the brain, taken as a whole, is the part of the human body through which the mind operates, had been from ancient times the general belief; but the localization of the several faculties was first attempted by Dr. Franz Joseph Gall, who gained, in 1804, a valuable coadjutor in Dr. Spurzheim. When Spurzheim visited Edinburgh, he met Mr. George Combe, who adopted his views, and in 1819 published "Essays on Phrenology," ultimately developed into his "System of Phrenology," which became very popular. Gall enumerated nearly 30, Spurzheim 35, mental faculties which he considered as primitive. These Spurzheim divides into moral, or affective, and intellectual. The affective faculties are subdivided into propensities producing desires or inclination, and sentiments, which along with this excite some higher emotion. The intellectual faculties are similarly divided into perceptive and reflective. They are then localized on the brain, or rather on the skull.

Phrygia, in ancient geography, an inland province of Asia Minor, bounded N. by Bithynia and Galatia, E. by Cappadocia, S. by Lycia, Pisidia, and Isauria, and W. by Mysia, Lydia, and Caria. It was called Phrygia Pacatiana, and also Phrygia Major, in distinction from Phrygia Minor, which was a small district of Mysia near the Hellespont, occupied by some Phrygians after the Trojan war. The part of Phrygia Major was also called Lycaonia. This region was a high table-land, fruitful in corn and wine, and celebrated for its fine breed of cattle and of sheep.

Phyrne

Phyrne (fri-ne), a famous courtesan of Greece, and mistress of Praxiteles, who employed her as a model for his statues of Venus. She acquired immense wealth and offered to rebuild Thebes, provided this inscription should be placed on the walls: "Alexander destroyed this city, and the courtesan Phyrne restored it"; but her offer was rejected.

Phyrnichus (frin'i-kus), a Greek tragic poet of the 5th century B. C. Departing from the custom of tragic poets, he took for the subject of his greatest tragedy "The Capture of Miletus" by the Persians, a contemporary event. It moved the Athenians profoundly, but they fined the poet 1,000 drachmas for harrowing their sensibilities by rehearsing the woes of their allies. Next he wrote "The Phœnician Women," commemorating the defeat of Xerxes at Salamis. He wrote also several tragedies on legendary themes, as "The Danaids"; "Actæon"; "Alcestis"; "Tantalus." Only fragments of his plays remain.

Phtha. See PTHAH.

Phthisis. See CONSUMPTION.

Phycology, that department of botany which treats of the algæ or seaweeds.

Phylactery, a charm, spell, or amulet worn as a preservative against disease or danger. In Judaism, small square boxes, made either of parchment or black calfskin, in which are inclosed slips of vellum inscribed with passages from the Pentateuch and which are worn to this day on the head and on the left arm by every orthodox Jew on week days during the daily morning prayer. The box of which the phylactery worn on the arm is made consists of one cell wherein is deposited a parchment strip, with the following four sections written on it in four columns, each column having seven lines:

IV. Deut. xi: 13-21.	III. Deut. vi: 4-9.	II. Exod. xiii: 11-16.	I. Exod. xiii: 1-10.
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These are the passages which are interpreted as enjoining the use of phylacteries. The box of which the phylactery for the head is made consists of four cells in which are deposited four separate slips of parchment, on which are written the same four passages of Scripture. On the outside of this phylactery to the right is impressed the regular three-pronged Hebrew letter *shin*, and on the left side is the same letter consisting of four prongs, which are an abbreviation for the Hebrew word *Shadai*, the Almighty. The phylacteries are generally made an inch and a half square, and have long leather straps attached to them, with which they are fastened to the head and

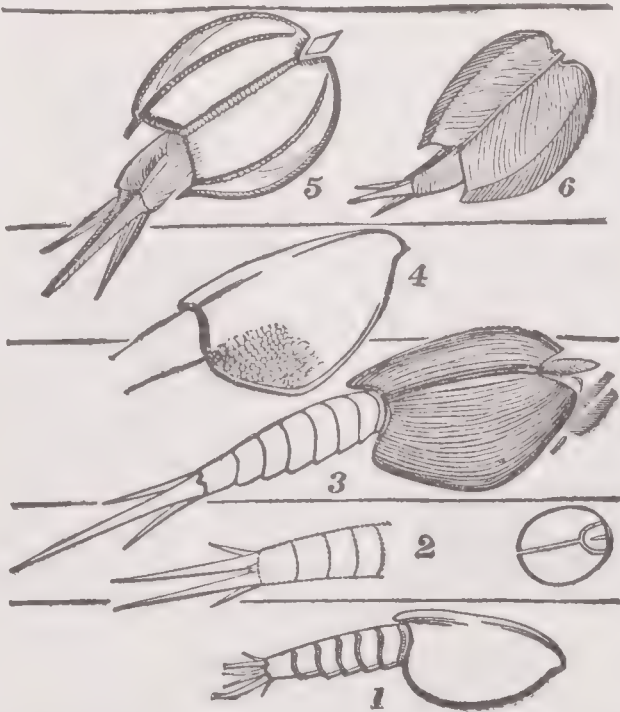
Phyllocarida

arm. They are worn during prayer and sacred meditation. The hypocrites among the Pharisees made them more than ordinarily large, so they might be visible at a distance, to indicate an absorption in prayer or holy meditation. Hence the rebuke of our Saviour (Matt. xviii: 25). Also a case in which the early Christians inclosed the relics of their dead.

Phyllis, in mythology, the name of the beautiful daughter of Sithon, King of Thrace, who, being betrothed to Demaphoon, fell into a languishment because he did not return in due time from a journey, and died of grief; or, by some accounts, hanged herself in despair, upon which her body was changed into an almond tree.

Phyllite, in mineralogy, a mineral found in small shining scales or plates in a clay-slate. Crystallization probably monoclinic. Hardness, 5 to 5.5; color, greenish-gray to black. Composition: Essentially a hydrated silicate of alumina, sesquioxide and protoxide of iron, protoxide of manganese, and potash. Found in Massachusetts and Rhode Island. Also a name given to some slaty rocks of cryptocrystalline to microcrystalline texture, apparently intermediate between mica-schist and ordinary clay slate, and which have been shown to result from the latter rock being metamorphosed by chemical and mechanical action under great pressure.

Phyllocarida, in zoölogy and palæontology; an order of Crustacea, represented by *Nebalia* and a number of fossil forms. The



RECENT AND FOSSIL PHYLLOCARIDA.

1. Hymenocaris. 2. Peltocaris. 3. Ceratiocaris.
4. Dictyocaris. 5. Dithyrocaris. 6. Argus.

group is intermediate between the Phyllopoda and shrimps (Decapoda). The body is compressed, with usually a large shield, a pair of stalked eyes; the hind body end-

Phyllodium

ing in two or three spines. There are eight pairs of broad, short, leaf-like feet. The fossil forms (*Ceratiocaris*, etc.,) flourished from the Silurian to the Carboniferous period. The living type is *Nebalia* bines; it ranges from Maine to Greenland and Norway, and it is only about half an inch long, while some of the fossil forms were about one foot in length.

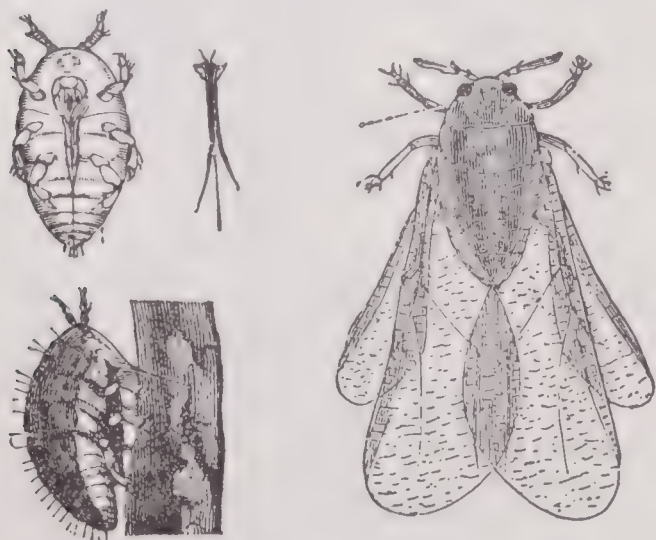
Phyllodium, in botany, the name given to a leaf stalk when it becomes developed into a flattened expansion like a leaf, as in some Australian species of acacia and certain other plants.

Phyllopoda, in zoölogy, an order of Crustacea, division Branchiopoda. The feet are never less than eight pairs, and are leafy in appearance. The first pair oar-like, the other branchial, and adapted for swimming. Carapace not always present. They undergo a metamorphosis when young, being called Nauplii. They are of small size, somewhat akin to the ancient Trilobites. Families two, *Apoidæ* and *Branchipodidæ*, genera, *Limnadia*, *Apus*, *Branchipus*, *Estheria*, etc. Fossil forms are found from the Silurian onward.

Phyllostomidæ, in zoölogy, the vampires, a family of insectivorous bats. See VAMPIRE BAT.

Phyllotaxy, in botany, the arrangement of leaves on a stem, the three common positions being opposite, alternate and verticillate.

Phylloxera, in entomology, a genus of insects of the order *Hemiptera*, sub-order *Homoptera*, the type of a family *Phyllox-*



PHYLLOXERA INSECT.

eridæ, allied to the *Aphis* and *Coccus* families. The *Phylloxeridæ* attach themselves to various plants, on the juice of which they feed, and which they often injure or destroy. *P. vastatrix* is the name given to an insect of this family, which, since 1865, has committed great devastation in the vineyards of France, and seems to have been imported

Physician

from North America. Great numbers of this insect appear on the roots of the vine, when they produce galls, and their punctures are so numerous and incessant that the roots can no longer supply nutriment to the plant, which fades and dies. There is a form which lives on the leaves, also producing galls.

Phylogeny, or **Phylogenesis**, tribal history, or the palæontological history of evolution. The phylum includes all organism connected by blood which are descended from a common parent form. Phylogeny includes palæontology and genealogy.

Physalia, in zoölogy, a genus of marine animals of the class Hydrozoa, of the subclass Siphonophora. The *P. atlantica* is known by the name of the Portuguese man of war. These hydrozoa are characterized by the presence of one or more large air sacs, by which they float on the surface of the ocean. Numerous tentacles depend from the under side, one class short and the other long. The shorter are the nutritive individuals of the colony, the longer, which in a *Physalia*



PHYSALIA.

five or six inches long are capable of being extended to 12 or 18 feet, possess a remarkable stinging power, and are probably used to stun their prey.

Physalis, in botany, a genus of herbs belonging to the *Solanaceæ* or nightshade family. The species most commonly cultivated in the United States is variously known as strawberry tomato, ground cherry or winter cherry.

Physapoda. See THYSANOPTERA.

Physician, a student of nature in general; a natural philosopher. Also one who is skilled in or practises the art of healing; one who, being duly qualified, prescribes remedies for diseases; specifically one who holds a certificate showing that he has passed an examination before a competent authority, such as the medical colleges of the United States or the State boards of medicine, authorizing him to practise. Strictly speaking a physician

differs from a surgeon, in that the former prescribes remedies for diseases, while the latter performs operations.

Physics, a study of the phenomena presented by bodies. It treats of matter, force and motion; gravitation and molecular attraction, liquids, gases, acoustics, heat, light, magnetism, and electricity. It is called also natural or mechanical philosophy. In its broadest acceptance the term physics includes chemistry; specifically it is limited to those phenomena based on the molecule as a unit, whereas the unit of chemistry is the atom.

Physics, Scope and Tendencies of.

The chief scientific event at the beginning of the past century was the discovery of the electric current of Volta. This discovery opened a new chapter in physical science—a chapter which has now become a book of many volumes. But it is within the latter half of the century, and since the discoveries of Faraday, that its extreme importance has been recognized; and it is within the last 25 years that its direct application on a large scale to ordinary human existence has begun. Already the applications of the electric current to human life bid fair to rival those of steam, if they do not already surpass them. Every telegraph and telephone message, every dynamo current, depends on the discoveries of Volta and Faraday. It is impossible to overestimate the gain to humanity of the work of some quiet seeker after truth who happens to be favored with success in that quest. From his time onward the benefit gradually increases, till it becomes so incorporated with their lives that people cease to think of it, accepting it in the unheeding way they accept the sun, and the air, and the soil. It is perhaps for this reason that they make so little effort to encourage a purely scientific explorer; they do not realize that facts which seem at first small and insignificant may bring forth fruit a thousandfold, and that whereas those who exploit and apply them usually need no encouragement beyond that which they freely receive, the original discoverer may be hampered and hindered in his work by the penury which accompanies non-recognition. It was the uniquely endowed laboratory of the Royal Institution, London, which enabled Faraday to realize his genius. Men able to experiment are not lacking: laboratories, research laboratories, and leisure to employ them, are the urgent need of all countries at the present time.

But though the foundations of modern electricity were being laid at the beginning, scientific progress during the first quarter of the century lay chiefly in the domain of optics. The mathematical possibilities of the wave theory of light kindled enthusiasm in the great physicists of that

day, and discoveries of the utmost brilliance in optics were rapidly made. The names of Young and Fresnel and MacCullagh stand out luminously in this period, as does that of Huyghens in the epoch immediately preceding. The investigation of interference and diffraction, and the discovery of polarized light, are not so widely appreciated as work of less merit in some other departments is; nevertheless, not only were the highest mathematical and experimental powers required for their elucidation, but there is a completeness and finish about these researches hardly to be found anywhere else, except in the dynamical theory of astronomy, the theory which we owe to Newton. It was probably this completeness and finish which delighted and satisfied the great French physicists of the period; and to them in great part our knowledge of the highest refinements of optics is due. The wave theory of light was not, however, strictly speaking, dynamical; that is to say, it was not directly based on Newton's laws of motion and the straightforward mechanics of matter. Indeed, the actual dynamical basis of the wave theory was by no means clear, nor is it thoroughly clear even at the present day. Nevertheless, the wave theory, so far as it went, admirably fitted the facts, and incorporated the whole of optics in a systematic and comprehensive way, so much so that it may almost be said that nothing of the first magnitude has been done in that subject since, always excepting the discovery and the applications of spectrum analysis—the analysis of light into its ingredients as emitted, each by a simply vibrating source.

During the next quarter of the century scientific progress lay chiefly in the department of heat and energy, and in the accumulation by Faraday of a mass of experimental materials ready for the organization and systematization of a later period. The works of Carnot and of Joule belong essentially to this epoch. The names of these two men are not so well known outside scientific circles as their genius and the importance of their discoveries warrant. Carnot died young, having laid the foundation for a comprehensive theory of all engines whose motive power is heat. Joule lived to old age, but worked quietly and secludedly in a suburb of Manchester, declining many of the scientific honors which would have been heaped on him and which might have brought his name into more public notice, happy only in his work and in its full and enthusiastic recognition by the leading spirits of his time. Hence to the outer world his name is comparatively unfamiliar. The result of all his work and that of his contemporaries is the unification of physics under the great generalization called the conservation of energy; and

the far-reaching theory of Helmholtz, developed from that of Mayer, as to the gravitative source of solar radiation energy, was thereby rendered possible.

The third quarter of the century is dominated by the names of Kelvin and Maxwell and Helmholtz. In it our theoretical and practical knowledge of electricity and its properties were widely extended, and an intimate connection was perceived between electricity and light. A great mathematical theory of electricity was elaborated akin to that of light in the early part of the century, not specifically dynamical (its dynamical basis, indeed, is not clear), but admirably fitting the facts and systematizing them in a comprehensive manner. That, too, is the date of a theory of vortex motion, and an attempted hydrodynamical theory of matter and many of its properties, such as elasticity and the like. There can hardly be any need to bring into notice this suggestive hypothesis—that matter is composed of vortices in a perfect fluid—for it has in some form caught the attention of every educated person. It has not yet been worked out in a complete and satisfactory theory, but it is extremely probable that some form or modification or extension of this hypothesis will be found to correspond with the truth; and the portion of it which explains elasticity and rigidity as due solely to motion, on the principle of the gyrostat or top on the one hand, and of the stiffness caused in a flexible tube by water driven rapidly through it on the other, cannot but be regarded as effectively substantiated.

The last quarter of the century was signalized by investigations connected with the ether of space, the direct production and detection of electric waves by Hertz, and the attempted unification of all material phenomena under one single dynamical conception (not dynamical exactly in the narrow sense, but essentially dynamical nevertheless, though of a generalized type), an ambitious attempt to grasp the whole of material and ethereal properties under one comprehensive scheme or formula. These matters are too recent, and in many respects too unfinished, for appropriate enlargement here.

Thus the mark of the century was a continuous attempt at a comprehensive understanding of nature, after the manner of Newton, but not limited or governed solely by his dynamical ideas. Throughout the century there were those who have insisted on a rigid application of the old dynamical laws; and of these the chief was Lord Kelvin. His influence on science, putting aside for the moment his many discoveries and inventions, was a steady-going one, constantly recalling physicists from flights of fancy to the rigorous fetters of Newtonian dynamics. His influ-

ence in this way was of the utmost benefit; it kept physics in a severe and strenuous condition, and it may be said that all that was dynamically possible in the narrow sense under these conditions has been done. But the question arises, and has constantly arisen, whether, after all, the complete explanation of the material universe can be made in terms of ordinary Newtonian dynamics. That Lord Kelvin has not succeeded to his own satisfaction in giving such a complete account, such a complete formulation of material existence, in spite of his extraordinary powers and preparedness, may be due to the fact that no complete formulation on these lines is possible. The properties of matter assumed by Newton and made the basis of his "Laws of Motion," may themselves require and be susceptible of explanation, though not of explanation in their own terms. The really fundamental dynamics, we are now beginning to see, must have an ethereal and not a material basis—must be something more general than what has hitherto been called dynamics, and must include it as a special case. The whole meaning of such fundamental concepts as motion, and matter, and inertia may have to be examined, analyzed, and explained. The laws of electricity may have to explain not magnetism only nor light only, but also matter itself; and the most fundamental property of matter, its inertia, may be susceptible of electric or ethereal explanation. The Newtonian laws of dynamics as applied to matter still hold, and will always hold, but they may no longer be fundamental or ultimate; they may be derivatives from a still deeper scheme, and it is toward this deeper scheme that physicists at present are groping. The realization of a need for some such scheme constituted the chief philosophic feature of the latter part of the century.

The great biological doctrine of evolution has not had very much influence on physics. An attempt has indeed been made to trace conjecturally the evolution of matter from some simple primordial substance; the different kinds of atoms being supposed to crystallize out at different stages in the past history of the world. But even if an interesting speculation like this turns out as in any way corresponding with facts, it would be a process very different from that contemplated by the doctrine of the evolution of living things by inheritance and survival; an evolution of material atoms would be a mere inorganic crystallization, for the essential features of struggle, and death, and survival, and hereditary descent would be entirely absent from it; indeed, the whole subject of life is at present alien from any scheme of physics which has so far been formulated.

It may be said that we dimly see our

way to a comprehensive unification of the material universe so far as it exists without the inclusion of life and mind. The unification is not complete, but it is in process of being completed, and though a vast amount in this department undoubtedly remains to be discovered, it is unlikely that any essentially new departure on totally unsuspected lines will be needed for its accomplishment. But when we come to the inclusion of life and mind, the prospect is quite otherwise. We have not at present even an inkling of how these things are to be included in the scheme of physics; the alphabet of their theory is not yet composed; they exist as empirical though undeniable facts. If it happen that during the 20th century their real meaning is grasped and formulated, it will not be by reason of any legacy left by the orthodox science of the 19th, but it will be a new development, of whose features only a few persons here and there, barely inside the pale of science, have at present any dim and rudimentary conception; and inasmuch as the laws of ordinary dynamics have shown themselves apparently incompetent to deal fully with the phenomena of light and electricity, so much the more is it unlikely that these laws will have any satisfying or comprehensive application in the regions of life and of mind. Nevertheless, the attempt to include life in a more general scheme of physical science is one that should be strenuously made, and in the long run it may conceivably turn out successful. We may find that a sufficiently complex molecule takes on of itself the functions of protoplasm, that a suitable accretion of protoplasm becomes a living cell, while an aggregate of cells constitutes a living organism. This undoubtedly represents the hope of biologists, and it is not an impossible one, nor one with which a physicist has any wish to quarrel. Indeed, many, though not all, physicists would agree to this, and would gladly join in the quest for a physical or material basis of life.

And "mind," too. There are some who would extend the same hopes and aspirations to mental phenomena also, and hold that a mechanical formulation of the universe must, when complete, include thought and consciousness also, as the outcome of the constitution of matter and the interaction of atoms. About the middle of the century this tendency or this hope was strongly manifest; it gave rise to enthusiastic "Eurekas" sounded long before their due time; the wish ran in advance of the facts, and prophecy, as in Tyndall's Belfast address, took the place of sober statement.

Permitting ourselves a similar latitude now, we may say that at the close of the century the tendency above noted is not so marked. It is, indeed, hidden, and may be

thought nonexistent, but it is still there and in a refined or inverted form. Those who hold it as a view, or a hope, no longer seek to reduce mind and life to a material level; rather they seek to elevate matter and all existence to the level of mind and spirit, that God may be all in all. Undoubtedly the philosophic attitude of the leading physicists at the close of the century is devout; the outlook appears to them no barren wilderness of materialistic atheism, but a land of promise, energized and suffused by a divinely immanent and all-inclusive spirit.

It is remarkable how such a conclusion can be held in view of all the facts now known; yet so it is. In the face of discoveries which time after time have seemed overwhelming, the old faith—the faith common to all humanity in its various grades—is still dominant; a link between the lowest savage and the highest sage. It is astonishing that so it should be. Epoch after epoch of scientific discovery has arrived, each having the apparent tendency to do what has been paradoxically called "eject the Creator from His world," by showing that the universe was able to run automatically and without guidance or interference, or even initial start; that it contained within itself all the elements of permanence, like a self-winding and unwearying clock. The final blow to the ancient doctrine, that the earth was a tended garden with all else subordinate to it, was dealt by the Copernican demonstration, enforced by Galileo, that it was only one, and a small one, among the myriads of other worlds. The Newtonian theory of astronomy, displaying the simple mechanism whereby all the motions and interactions of all these bodies went on in a perfectly predictable and automatic manner, without guidance or propulsion, though it never seems to have excited the conspicuous ire of theologians, was nevertheless well calculated to do so; and if its immediate consequences had been grasped, it ought, one would think, to have met with opposition. It was a camel compared with the Copernican gnat.

Then gradually came an insistence on an extended form of the Cartesian theory of the mechanical or automatic nature of life: the doctrine that living processes are likewise governed by the ordinary laws of physics and chemistry; that though they are peculiarly complex and difficult to follow in detail, they are nevertheless of the same intimate nature as the working of inorganic atomic machinery, and involve nothing essentially new. This is even now not a known fact, but a dogma—a dogma held with various degrees of tenacity and not yet made an article of scientific faith. But the discoveries of geology stand in a different category; these show undoubtedly that

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the earth has existed millions of years longer than had been supposed; that its surface has been subjected to extraordinary changes; that animal and plant life has never been lacking from extremely remote periods, and has gradually by exceedingly slow steps improved in quality, showing no sign of having sprung full-fledged into existence by creative fiat.

The conservation or constance of energy; the doctrine that no new energy ever makes its appearance; the discovery that, on the other hand, heat is not constant, but can be manufactured *de novo* by the clash of matter; the corresponding explanation of suns and solar systems by the condensation of nebulae (originally an unsubstantiated inspiration of Kant); the more recent discoveries that a mass of matter, simply by being large enough, thereby possesses an atmosphere, becoming a possible habitable planet; and that another mass by being very much larger may, solely for that reason, be white-hot and therefore become a sun, capable of affording the conditions necessary for the maintenance of life on planets revolving around it—these facts all tend in the same anti-theological direction and conspicuously have led students along that path. And then, finally, the view that inheritance and survival without guidance or control, were adequate satisfactorily to explain all the forms and adaptations of animal and vegetable life, whenever there was contest enough to stimulate activity and to destroy the feeble and unfit—this doctrine was, and is to this day, held by many to complete the demonstration of purely automatic working, and to leave no room for any but mechanical and material guidance or “cause.”

Yet, in spite of all this tendency, the actual result has been different from what was expected. The outlook does not correspond with what was, by some hopefully, by others dreadfully, anticipated. The unspoken thoughts of the leaders of science, acquainted with all these discoveries, have become not less but more essentially religious, employing the term in a broad sense without reference to churches or sects. They realize that all this may be true, but that much else may be true, too; they perceive that all our boasted progress is, after all, only a beginning; that we are still, as it were, in the dawn of human intelligence; that the human mind is only beginning to realize its power of exploring, and, in a blind way, of understanding the secrets of nature, and that it would be indeed a narrow and superficial and purblind view to take if, in the enthusiasm generated by a few material conquests, the deeper feelings and instincts and emotions of the human spirit were thwarted and crushed. It is felt that, after all, what we are really and primarily conscious of is not matter,

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nor force, nor energy, nor any kind of outside occurrence; all these are inferences; that which we inevitably and diligently feel is “ourselves,” our own intelligent and perceiving consciousness. And just as it is in terms of this subjective central reality that all else must be stated and comprehended, so it may objectively be with the cosmos; its essence and core may be no external phenomenon, such as serves to appeal to our organs of sense, but an all-embracing, penetrating, and inspiring Thought.

OLIVER LODGE.

Physiognomy, the art or science of judging of a person's nature or character by his outward look, especially by his facial features and characteristics. In the ordinary business of life, all men are more or less influenced by the belief that the character and disposition of a person may, in some measure, be judged of by his physical appearance, and none have more confidence in this way of judging than those who have most occasion to act on it.

Physiology, the science which treats of the processes which go on in the bodies of living beings under normal conditions, and of the use of their various parts or organs. It is divided into plant physiology, animal physiology (according to whether plants or animals are the subject of study), and human physiology (a branch of animal physiology in so far as it relates to man). Thus the whole subject of physiology is a branch of general biology; while human physiology is a valuable adjunct and preliminary to the study of medicine, since the study and knowledge of diseased or abnormal conditions, can only be scientifically undertaken when the normal processes of the body have first been studied. One of the simplest forms of animal life is seen in the amœba of pond water or the white corpuscle or leucocyte of the blood. These simple organisms are composed each of a single physiological unit, which is termed a cell, that is to say there are no organs for the carrying on of the various functions of life, but all take place in the same microscopic semifluid mass of complex organic nature termed the cell protoplasm. All animals no matter how complex be their structure resemble this primitive type, for they consist of an aggregation of microscopic cells. The important difference lies in the subdivision of labors which takes place in the higher animal in which one set of cells carries out one specific function while another set are busy in attending to labor of quite a different type. Thus, in the leucocyte or amœba all kinds of labor proceed in the same cell which imbibes its own food, prepares its own nutriment from the food so taken in, is capable of moving from place to place, and in the end is capable of reproducing

its like by division. In the higher animal by the evolution of different types of cell, which start from the same parent cell initially but develop afterward along different lines, there come to be formed the various different tissues, glands and organs, each with its own specific function to perform for the general welfare of the whole mass or colony of cells constituting the animal or individual. Thus the skeletal system develops for the support and maintenance of form of the whole; the muscular system to bring about the movements of the animal as a whole and of its various parts with respect to one another; the digestive system for preparing the nutriment for the whole system; the vascular or circulatory system with its contained blood for carrying the nutriment so prepared and distributing it to all the various parts; the respiratory system for taking in oxygen from the air, necessary for the combustion of the foodstuffs and for carrying off the carbon dioxide formed by such combustion in the various tissues; the excretory system for the removal of chemical waste products formed in the tissues; and the nervous system for setting the animal tissues in communication with what is passing both in the body and in the external world.

The source of all the energy of an animal lies in its food, and this is either burned as it were within the tissues, used as fuel for the protoplasmic machinery, or used to keep that machinery in repair; in either case the foodstuffs have to be prepared before they can be used. Such preparation is called digestion, which consists in making the solid foodstuffs soluble. The digested food is absorbed into the blood, and all of it, except the fat, is carried direct to the liver. The liver, among other functions, regulates the composition of the blood, thus, it stores the sugar in its cells and gives it out as the other tissues require. Muscular tissue is the great consumer of sugar, which is to the cells what coal is to the steam engine. But there is another and most important foodstuff that requires no digestion. This is oxygen, which is needed by the protoplasm for its life, and also for the burning of fuel within the living machinery to get heat and energy of motion. The oxygen is held in the BLOOD (*q. v.*) by means of a special substance which greedily absorbs it from the air in the lungs, and yet gives it up readily to the protoplasm of the tissues. The blood as is well known circulates round and round the body pumped by the heart. It is a stream of food material by which each cell of the tissue is fed. For each cell is close to a capillary, which is a very thin walled blood-vessel, along which the fluid food flows, and as it flows the

fluid part or plasma exudes and bathes the tissues. The plasma which has thus passed out of the blood vessels is collected into another system of vessels, the lymphatics, and eventually emptied into one of the great veins. The lymph stream is also the drain into which is thrown by each cell the waste products of its activity. The carbonic acid that is formed in the tissues is carried away by the blood, and escapes out of the system from the lungs. Some of the useless water is also got rid of in the same way, and some more of it is sweated out by the glands in the skin; the rest is filtered out of the blood by the kidneys. There are many other waste matters besides carbonic acid and water. These are to a large extent, prepared for excretion in the liver, and to some extent actually taken out of the blood by that organ, being poured into the intestines, mixed with other matters, dissolved in a fluid called BILE (*q. v.*). They are all taken out of the blood by the kidneys, and cast out of the body along with the water filtered out by the same organs, as urine. For comparative physiology, see the articles on the various functions and groups of animals.

Physostigma, in botany, a genus of *Leguminosæ*, tribe Phaseoleæ. *P. Venenosum* is the calabar bean from Western Africa. It is a twining climber, with pinnately trifoliate leaves, purplish flowers, and legumes about six inches long. It is very poisonous, but a watery solution has been used externally in certain affections of the eye, and internally in poisoning by strychnia, in tetanus, chorea, and general paralysis of the insane.

Phytolacca, in botany, the typical genus is of the tribe Phytolacceæ and the order *Phytolaccaceæ*; calyx six pointed with membranous edges; corolla none; stamens 5 to 20; styles 5 to 12, tropical and subtropical herbs, known species about 10. The leaves of *decandra*, the Virginian poke-weed, or pocum, are very acrid, but after being boiled they are sometimes used in the Southern States for food. A tincture of the ripe berries has been given against chronic and syphilitic rheumatism; but a spirit distilled from them is poisonous, and the leaves produce delirium. The plant is deemed useful in cancer; externally, it has been used in psora and ringworm. The pulverized root is emetic and purgative. The leaves of *P. acinosa* are eaten in Nepal in curries, but the fruits produce delirium. *P. drastica*, a native of Chile, is a strong purgative.

Phytology, a word formerly sometimes used for botany.

Phytozoa, a name synonymous with Zoöphytes.

Piacenza

Piacenza, a city of Northern Italy, on the right bank of the Po, a little below its confluence with the Trebbia, 43 miles S. E. of Milan and 35 N. W. of Parma. Situated at the end of the Via Æmilia and at the last convenient crossing place E. on the Po, it has always been an important city, both strategically and commercially, since its foundation (as Placentia) by the Romans in 219 B. C. It is defended with bastioned walls and an outer ring of forts. Its streets are broad and regular, but many of them unfrequented and grass-grown. The cathedral, in the Lombard-Romanesque style (1122-1233), has an immense crypt, a campanile 223 feet high, and paintings by L. Carracci, Guercino, and others. The church of Sant' Antonino, the original cathedral, was founded in 324, but has been several times rebuilt. The church of Santa Maria della Campagna is adorned with fine frescoes by Porde none; and it was for San Sisto that Raphael painted the celebrated Sistine Madonna, sold in 1754 by the monks to Frederick Augustus of Saxony. Among the other buildings are the Palazzo Farnese (1558), once a sumptuous edifice, but since 1800 in use as barracks; the communal palace (1281), and the court house. The principal square is adorned with colossal bronze equestrian statues of Alessandro and Ranuccio Farnese. Manufactures of silks, cottons, pottery, hats, etc., are carried on. The more notable facts in the history of Piacenza have been its capture by the Gauls in 200 and by Totila in 546, the meeting here of two Church councils in 1095 and 1132, its active zeal as a member of the Lombard League in the 12th century, the sacking of it by Francesco Sforza in 1447, and its union with Parma. Pop. (1909) 36,064.

Piamater, a delicate, fibrous, and highly vascular membrane, immediately investing the brain and the spinal cord; hence, sometimes used for the brain itself.

Pianoforte

Piano (Italian), in music, a term meaning soft, or low; used in contradistinction to *forte*. *Pianissimo*, the superlative of *piano*.

Pianoforte (Italian *piano* = soft, and *forte* = strong, loud; so-called from its pro-



CATHEDRAL OF PIACENZA.

ducing both soft and loud effects), a musical instrument, the sounds of which are produced by blows from hammers, acted on by levers called keys. This is probably the most widely-known and generally-used musical instrument in the world. Though slight improvements are from time to time made in its mechanism, it may be described as the perfected form of all the ancient instruments which consisted of strings struck by hammers. Originally the strings were placed in a small and portable box, and struck by hammers held in the hands. In this early shape, known as the "dulcimer," the instrument can be traced in nearly every

part of the globe, and it now survives, almost in its original form, both in Europe and Asia. The dulcimer was also called psaltery, sautrie, or sawtry. The name given to the first instrument with keys acting on hammers was clavictherium, or keyed-cithara, which was introduced in the 15th, or early in the 16th century; next came the clavichord, or clarichord, sometimes called monochord, in which quills plucked the strings; the VIRGINAL (*q. v.*) soon followed; this was succeeded by the spinet, of similar construction but generally triangular in shape; then came the harpsichord, a vast improvement on its predecessors, having a more extended compass and often two manuals. The earliest form of pianoforte, early in the 18th century, was perhaps, in some respects, inferior to a fine harpsichord, but it possessed the elements of expansion, as now exhibited in a modern grand trichord pianoforte of more than seven octaves compass, with every gradation of sound, from pianissimo to a splendid fortissimo, and the most sensitive and delicate mechanism between the finger and the hammer.

Piarist, in the plural form, the regular clerks of the *Scuole Pie* (religious schools), founded at Rome toward the end of the 16th century, for the work of secondary education. They were sanctioned by Paul V., in 1617, as a congregation with simple vows, and became a religious order in 1621.

Piassaba, or **Piassava**, a strong vegetable fiber imported from Brazil, and largely used for making brooms. It is chiefly obtained from palms such as *Attalea funifera* and *Leopoldinia piassaba*. The fiber proceeds from the decaying leaves, the petioles of which separate at the base into long, coarse, pendulous fringes. It was first utilized in England, and the consumption is now large. Other European countries also consume considerable quantities.

Piaster, or **Piastre**, a coin of various values. The gold piaster of Turkey = 4.4c.; the silver piaster = 4.35c.; the Egyptian piaster = 4.9c.; the Spanish piaster is synonymous with the United States dollar. The old Italian piaster was equivalent to about 89 cents.

Piatt, Donn, an American journalist; born in Cincinnati, O., June 29, 1829; was secretary of legation at Paris, and was for nearly a year chargé d'affaires; during the Civil War was assistant adjutant-general on the staff of Gen. Robert C. Schenck; was subsequently in the Ohio Legislature; was one of the founders of the New York "Sun" and afterward of the Washington "Capital," which he edited for two years. He died in Cleveland, O., Nov. 12, 1891.

Piatt, John James, an American poet; born in Milton, Ind., March 1, 1835. He entered journalism; became clerk of the Uni-

ted States Treasury Department and of the House of Representatives; and from 1882 to 1894 was consul at Cork, Ireland. His works include: "Poems by Two Friends" (1860), with W. D. Howells; "The Nests at Washington" (1863), with Mrs. Piatt; "Poems in Sunshine and Firelight" (1866); "Western Windows" (1868); "Idyls and Lyrics of the Ohio Valley" (1884); "At the Holy Well"; "The Hesperian Tree" (1900).

Piatt, Sarah Morgan (Bryan), an American poet, wife of John J.; born in Lexington, Ky., Aug. 11, 1836. Her best-known works are: "A Woman's Poems" (1871); "A Voyage to the Fortunate Isles" (1874); "Dramatic Persons and Moods" (1880); "The Witch in the Glass" (1888); "An Enchanted Castle" (1893).

Piauhi, or **Piauhy** (pē-ou-ē), a province of Brazil, bounded by the Atlantic and the provinces of Ceará, Pernambuco, Bahia, and Maranhao, from which latter it is separated by the Parnahyba; area, 81,755 square miles. Its coast line is not above 10 miles in length. The soil, generally composed of alluvium, is of great natural fertility; but there is very little agriculture. The rearing of cattle, esteemed the best in Brazil, constitutes the principal source of wealth. Capital, Therezina; port, Parnahyba.

Piazza, a square open space surrounded by buildings or colonnades; popularly, but improperly, applied to an arcaded or colonnaded walk under cover, and even to a veranda.

Piazzi, Giuseppe, an Italian astronomer; born in Ponte, Italy, July 16, 1746. After holding professorial chairs of philosophy, mathematics, and theology at Genoa, Malta, Ravenna, and Rome, he was appointed in 1780 to the chair of mathematics in Palermo; and there, with the aid of government, he established an observatory in 1789. He made a catalogue of the stars, published in 1803, and again extended in 1814. In 1801 he discovered the asteroid Ceres. He died in Naples July 22, 1826.

Pibroch (pe-brok), a series of variations, or a sort of fantasia, played on a bagpipe, descriptive of some scene or of a poetical thought. The pibroch is the most characteristic form of national music, and can only be learned by personal instruction, as the scale of the bagpipe contains sounds unrepresented by any notation. Pibroch is sometimes used figuratively for the bagpipe itself.

Pica, an alphabetical catalogue of things and names in rolls and records; in medicine, a vitiated appetite, which causes the person affected to crave things unfit for food, as coal, chalk, etc.; in printing, a name given to a size of type, 72 ems to the foot, or 6x6 to the square inch. It is the standard of measurement in printing.

Picard

In ornithology, a genus of *Corvinæ* (in older classifications, of *Corvidæ*), with nine species from the Palæarctic region, Arctic America, and California. Bill entire, with cutting edges, furnished at the base with setaceous feathers lying forward; tail very long, graduated. *P. rustica* is the magpie.

Picard, Jean, a French astronomer; born in La Flèche, France, July 21, 1620. In 1655, he became Gassendi's successor in the chair of astronomy in the Royal College of France. The measurement of an arc of the meridian is the work by which Picard is now chiefly known — a measurement historically important in the science of astronomy, as it furnished Newton with the means of verifying his theory of gravitation. He died in Paris, Oct. 12, 1682.

Picard, Louis Benoit (pe-kär'), a French writer of comedy; born in Paris July 29, 1769. At 20 he was a writer for the stage, but in 1797 he first came into prominence with the comedy "Mediocre and Groveling" (worked over by Schiller in "The Parasite"). He then went on the stage, and in 1801 became director of the Louvois Theater; but renounced the stage in 1807, was elected to the French Academy, and was appointed director of the Imperial Academy of Music. His best comedies are: "The Little City"; "Monsieur Musard" (Mr. Trifler); "The Puppets"; "The Two Philiberts." He died in Paris, Dec. 31, 1828.

Picardy, an ancient province in the N. of France, bounded on the W. by the English Channel, and on the E. by Champagne. The territory now forms the department of Somme, and portions of the departments of Aisne and Pas-de-Calais.

Picayune, the name of a Spanish half real in Florida, Louisiana, etc.

Piccini (pit-chē'nē), **Niccolo**, an Italian musical composer; born in Bari, Italy, in 1728. He composed comic and serious



NICCOLO PICCINI.

operas, chiefly for the stages of Rome and Naples, with such success that for many years he was without a rival in Italy. In 1776 he accepted an invitation, on very favorable terms, from the French court, and went to Paris, where he engaged in the famous musical contest with GLUCK (q. v.). In his later years he fell into misfortunes. He wrote over 150

Piccolomini

operas, besides numerous oratorios and cantatas. He died in Passy, France, May 7, 1800.

Picco Pipe, a small pipe, having two ventages above and one below. It is blown by means of a mouth-piece like a *flûte à bec* or whistle; and in playing, the little finger is used for varying the pitch by being inserted in the end. The player, Picco, after whom it was named, produced a compass of three octaves from this primitive instrument.

Piccolo, a small flute, having the same compass as the ordinary orchestral flute, but its sounds are one octave higher than



OCTAVIO PICCOLOMINI.

the notes as they are written; called also an octave flute. Also, an organ stop of two feet length, the pipes are of wood, the tone bright and piercing. Also, a small upright piano, about three feet and a half high; used for certain brilliant effects.

Piccolomini, a distinguished Siennese family, still flourishing in Italy in two branches. The two most celebrated members are: (1) ÆNEAS SYLVIVS BARTHOLOMÆUS, afterward Pope Pius II. (2) OCTAVIO, a grand-nephew of the first; born in 1599, died in Vienna in 1656. He served in the armies of the German emperor, and became one of the distinguished generals in the Thirty Years' War. He was a favorite of Wallenstein, who entrusted him with a knowledge of his projects, when he purposed to attack the emperor. In spite of this he made himself the chief instrument of Wallenstein's overthrow, and after the latter's assassination (1634) was rewarded with a portion of his estates. He is one

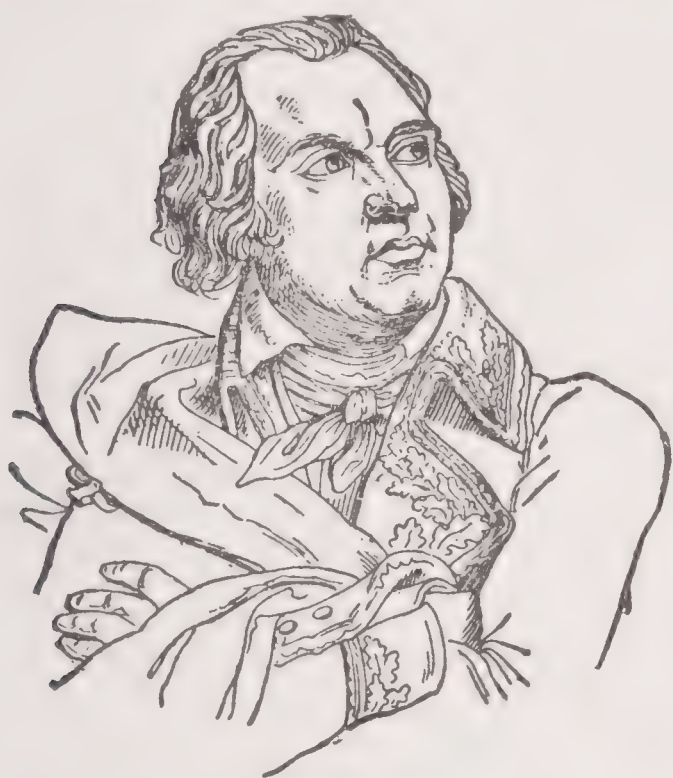
Pic du Midi

of the principal characters in Schiller's drama of "Wallenstein," to the second part of which he gives the title. His son Max, who appears in the same play, is an invention of the poet's.

Pic du Midi, a summit of the Pyrenees, 9,466 feet high, in the S. E. corner of the French department of Basses-Pyrénées.

Pice, a small East Indian coin, value about three-quarters of a cent.

Pichegru, Charles (peezh'groo), a French military officer; born in Arbois, France, Feb. 16, 1761, of humble parents, but receiving a good education under the



CHARLES PICHEGRU.

monks of his native town. Entering the army he rose to be sergeant. The revolution elevated him to the rank of general, and, in 1794, he succeeded General Hoche in the command of the Army of the North. He shortly after relieved Landau, and compelled the English to evacuate the Netherlands. He next marched into Holland, of which he made a complete conquest, and, in 1797, was elected a member of the Legislative body; but his opposition to the Directory, and his speeches in favor of the royalist emigrants, occasioned an accusation against him as designing to restore royalty. He was ordered without trial to be transported to Cayenne, whence he escaped to England, where he remained till the spring of 1804; he returned to Paris, was again apprehended and sent to the Temple, where he was found strangled in his bed, April 5, 1804.

Pichincha, "boiling mountain," the most populous province of Ecuador, embraces the Quito plateau and its slopes; area 8,300 square miles. The soil is fertile in the W. The province takes its name

Pickens

from the active volcano of Pichincha, 8 miles N. W. of Quito, the chief town. It has five peaks, two of which (15,918 feet) Mr. Whymper ascended in 1880. The enormous crater, nearly a mile across at the top and perhaps 1,500 feet in diameter at the bottom (which is 2,500 feet below), is said to be the deepest in the world. Pop. (1890) 205,000.

Pichler, Karoline, an Austrian novelist; born in Vienna, Sept. 7, 1769. She was a very prolific writer. Among her stories are: "Agathocles" (3 vols. 1808); "Woman's Worth" (4 vols. 1808); "The Siege of Vienna" (3 vols. 1824); "The Castle among the Mountains"; "Black Fritz." She died in Vienna, July 9, 1843.

Pichurim Beans, a name given to the seed lobes of *Ocotea pichurim*, a South American tree. They resemble nutmeg and sassafras in taste and are used for flavoring chocolate, etc.

Picidæ, woodpeckers; a family of zygodactyle Picarian birds, with, according to Wallace, 30 genera and 320 species, almost universally distributed, being only absent from the Australian region beyond Celebes and Flores. Bill more or less straight; toes in pairs. They are insectivorous; the tongue is extensile, barbed at the point, and covered with a viscid solution to assist them in catching their prey; tail feathers hard and stiff, terminating in points, enabling the bird to run up the trunks of trees with facility.

Pickens, Andrew, an American military officer; born in Paxton, Pa., Sept. 13, 1739, of Huguenot ancestry. In 1752 he removed to South Carolina; was engaged in the expedition against the Cherokees in 1761. During the Revolution he was promoted Brigadier-General; took part in the defense of South Carolina against the British. He defeated the Tories at Kettle Creek, and in the battle of the Cowpens, commanded the militia, rallying them when retreating; received a sword from Congress for gallant conduct. He served in Congress from 1793 to 1795; and made treaties with the Indians. He died in Tomassee, S. C., Aug. 17, 1817.

Pickens, Israel, an American politician; born in North Carolina, in 1780. He was a Democratic member of Congress from North Carolina in 1811-1817; governor of Alabama in 1821-1825; and became United States Senator in 1826. He died near Matanzas, Cuba, in 1827.

Pickens, Fort, a fort on Santa Rosa Island, Pensacola harbor, held by a small Union force under Lieut. A. J. Slemmer at the beginning of the Civil War. It refused to surrender when besieged by the Confederates in 1861, and was held till reinforced.

Pickerel

Pickerel, a small pike, a young pike. The term is applied to several species of fishes belonging to the pike family.

Pickerel Weed, a genus of fresh water plants, the *Pontederia*.

Pickering, Charles, an American physician, grandson of Timothy; born in Susquehanna co., Pa., Nov. 10, 1805. He traveled extensively, and published the volumes: "The Races of Man and their Geographical Distribution" (1848); "Geographical Distribution of Animals and Man" (1861); "Chronological History of Plants" (1879). He died in Boston, March 18, 1878.

Pickering, Edward Charles, an American astronomer, great-grandson of Timothy Pickering; born in Boston, Mass., July 19, 1846; was graduated at Harvard in 1865; Professor of Physics at the Massachusetts Institute of Technology in 1868-1877; Professor of Astronomy and Geodesy, and Director of the Observatory at Harvard after 1876. He published "Elements of Physical Manipulation" in 1874-1876. On July 21, 1901, he photographed the spectrum of lightning from the study of which he developed a revolutionary scientific theory of the compound nature of the so-called chemical elements.

Pickering, John, an American philologist, son of Timothy; born in Salem, Mass., Feb. 7, 1777. He held many important public positions; was president of the American Academy of Arts and Sciences, and a member of various learned associations at home and abroad. He published a paper on the "Adoption of a Uniform Orthography for the Indian Languages" (1820); a "Vocabulary of Words and Phrases Peculiar to the United States" (1816); a "Greek Dictionary" (1826); and wrote many pamphlets on scientific and political questions. He died in Boston, May 5, 1846.

Pickering, Timothy, an American statesman; born in Salem, Mass., July 17, 1745; was graduated at Harvard in 1763, and admitted to the bar in 1768. He participated in the battle of Lexington; in 1776 joined the Continental army in command of 700 men; was soon appointed adjutant-general by Washington; in 1780 was selected for the post of quartermaster of the army, and from that time till the close of the war conducted his department with great skill. Shortly after his resignation, he united with Patrick Henry and Alexander Hamilton in opposing the measure that drove the Tories from the country. He negotiated a treaty between the United States and the Six Nations in 1791, and a month later was appointed Postmaster-General. He was Secretary of State under Presidents Washington and Adams, but was dismissed during the "X. Y. Z." papers dispute in 1800. He retired from politics for a time, but was elected

Pico

to the United States Senate in 1804, and from that time continued actively in politics. He died in Salem, Jan. 29, 1829.

Pickering, William Henry, an American astronomer; born in Boston, Mass., Feb. 15, 1858; brother of Edward Charles Pickering; was graduated at the Massachusetts Institute of Technology in 1879; became assistant professor at the Harvard Observatory; and conducted several expeditions to observe the total solar eclipses in different parts of the Western Hemisphere in 1878-1893. He established astronomical stations in Southern California in 1889; at Arequipa, Peru, in 1891; and at Mandeville, Jamaica, W. I., in 1900. He had a record as a mountain-climber, having ascended over 100 peaks. Among his astronomical works is "Visual Observations of the Moon and Planets."

Pickeringite, a mineral found in masses of long fibers or acicular crystallizations. Monoclinic. Hardness, 1; luster, silky; color, white; taste, bitter to astringent. Composition: Sulphuric acid, 37.3; alumina, 12.0; magnesia, 4.6; water, 46.1 = 100, — formula, $\text{MgOSO}_4 + \text{Al}_2\text{O}_3 \cdot 3\text{SO}_3 + 22\text{H}_2\text{O}$. Found near Iquique, Peru.

Picket, a stake with a sharpened end, used in laying off ground for fortifications. Also a stake sharpened at both ends; one driven into the ground and the other acting as an obstacle to the advance of the enemy. Also a guard posted in front of an army to give notice of the approach of the enemy; an outlying picket.

Pickett, George Edward, an American military officer; born in Richmond, Va., Jan. 25, 1825; was graduated at the United States Military Academy in 1846; served in the Mexican War as lieutenant and was made captain in 1855. In 1861 he left the United States service and entered the Confederate army. He was commissioned Brigadier-General and was distinguished throughout the war for bravery and activity. In 1862 he was made Major-General. He took a prominent part in the battles of Fredericksburg, Gettysburg (where his division made the famous "Pickett's charge"), Petersburg, and Five Forks. He died in Norfolk, Va., July 30, 1875.

Pickles, a term generally applied to vegetables preserved in vinegar, with or without spices; though the term "pickled" applies to animal food preserved in salt. The vegetables most often pickled are cabbage, cauliflower, gherkins (young cucumbers), French beans, onions, walnuts, mushrooms, and nasturtiums. Chile peppers and sweet peppers, olives, and capers are the most common kinds of imported pickles and mangoes are occasionally used.

Pico, one of the Azore Islands, consisting of a single volcanic mountain, which terminates in a peak (El Pico) 7,613 feet high,

Pico della Mirandola

that emits smoke and lava. It is fertile and well wooded, and produces an excellent wine, of which 25,000 pipes are exported annually. Area, 254 square miles; pop. 24,000.

Pico della Mirandola. See MIRANDOLA.

Pico de Teide. See TENERIFE, PEAK OF.

Picot, Georges (pē-kō'), a French historian; born in Paris, Dec. 24, 1838. He succeeded Thiers as member of the Institute in 1878, and on the death of Jules Simon in 1896 became permanent secretary of the Academy of Sciences. He wrote: "Elections to the States-General in the Provinces from 1302 to 1614" (1874); "The Parliament of Paris under Charles VIII." (1877); "Judiciary Reform in France" (1881); "A Social Duty and Workmen's Homes" (1885); "History of the States-General and their Influence on the Government of France from 1355 to 1614" (4 vols. 1872), his principal work, which twice won the Gobert prize of the Academy (2d ed. 5 vols. 1888); "Ettienne Marcel, Legend and Historic Truth" (1880); "Judicial Reform in France" (1881); "The True Conservative Party" (1886); "The Religious Pacification" (1892). He died Aug. 17, 1909.

Picquart, George, a French military officer; born in Strasburg in 1854; was educated at St. Cyr, 1872-1874, and at the General Staff School in 1874-1876, gaining high places at the examinations in both schools. After serving in Algeria with the Zouaves he entered the infantry, and gained the captaincy in 1880. In 1883 he was appointed to the War Office staff, and in 1885-1888 served in Tonkin, where he earned a decoration. Returning to France he became professor at the Military School, and in 1893 rejoined the War Office, becoming head of the Intelligence Department in succession to Colonel Sandherr, in 1895. The next year he was given the rank of lieutenant-colonel, but then he began his inquiries into the Dreyfus case, moved thereto by certain discoveries which he made as to Major Esterhazy. In this he was at first encouraged by his official superiors, but afterward discouraged, and in January, 1897, he was sent in disgrace to Tunis. He returned to take a prominent part in the inquiries and legal proceedings which took place in the winter of 1897 and during 1898, and his evidence formed the strongest proof of the illegality of the trial at which Dreyfus was condemned, and of the astounding methods employed by the War Office to hush up the affair. In February, 1898, he was placed on the retired list, and afterward prosecuted on a charge of revealing War Office secrets. He was released after a long imprisonment, and was one of the most important witnesses in Dreyfus's trial at Rennes.

Picton

Picrate, or **Carbazotate**, a compound of picric or carbazotic acid with a base.

Picrate of potash, a salt of a beautiful yellow color, crystallizing into prismatic needles, and possessing a brilliant reflection. It is insoluble in alcohol, but soluble in about 260 parts of water at 15°, or 14 parts of boiling water. Heated with care, it becomes orange-red at the temperature of 300°, but, on cooling, it assumes its original color. Heated to 310°, it detonates with violence. New explosive powders, almost entirely composed of picrate of potash, and nitrate of potash, were used in the Franco-Prussian War of 1870 with the most appalling effect.

Picrite, a rock, consisting principally of olivine and augite, with occasionally hornblende, felspar, and magnetite. First found at Teschen, Silesia.

Picrotoxin, in chemistry, $C_{12}H_{14}O_5$, the poisonous principle of *Cocculus indicus* and extracted from that berry by means of hot alcohol. It is inodorous, intensely bitter and neutral to test-papers, crystallizes in stellate groups of needles, difficultly soluble in water, very soluble in alcohol, ether, and in warm fixed oils. With baryta, lime, and lead oxide it forms uncrystallizable compounds which are difficult to purify.

Pictet, Adolphe, a Swiss philologist; born in Geneva, Switzerland, Sept. 11, 1799. He wrote on the Celts and the primitive Aryans. To the same Genevese family belonged Marcus Auguste Pictet (1752-1799), physicist; François Jules Pictet (1809-1872), zoölogist and palæontologist; and Raoul Pictet, chemist and physicist, known in connection with the liquefaction of oxygen.

Picton, Sir Thomas, a British military officer; born in Poyston, Pembrokeshire, England, in August, 1758. He entered the army in 1772, and two years later joined his regiment at Gibraltar. In 1794 he went out to the West Indies; took part in the conquest of several of the islands, including Trinidad, and was appointed (1797) governor of the last named, being shortly afterward promoted general. In 1803 he was superseded, but immediately after appointed governor of Tobago. He saw active service again, in 1809, and was made governor of Flushing after its capture by the English; he was summoned to Spain, and rendered brilliant service at Busaco, during the subsequent expulsion of the French from Portugal, at Fuentes de Onoro, at the sieges of Ciudad Rodrigo and Badajoz, at Vittoria and in the battles of the Pyrenees, at Orthez and before Toulouse. Napoleon's escape from Elba once more called Picton into the field; he fought at Quatre Bras, and at Waterloo fell leading his men to the charge, June 18, 1815.

Pictor

Pictor, or **Equuleus Pictorius** ("the Painter's Easel"), or **LITTLE HORSE**, one of the 14 constellations added to the heavens by Lacaille. It is surrounded by Volans, Dorado, Cælum, Columba, Puppis, and Carina.

Pictou, a port of entry on the N. coast of Nova Scotia, on a large and sheltered harbor, 85 miles N. N. E. of Halifax. The town contains several mills and factories, and coal, mined in the vicinity, is exported.

Picts, the name by which, for five and a half centuries (A. D. 296-844), the people that inhabited Eastern Scotland from the Forth to the Pentland Firth, were known. In the Irish chronicles they are generally styled Picti, Pictones, Pictores, or Piccar-daig—all forms of the same root; but sometimes the native Gaelic name of Cruithnig is applied to them, and their country is called Cruithen-tuath, the equivalent of Latin Pictavia and Old Norse Petland, which still survives in the name of the Pentland Firth. There were Cruithni or Cruithnig also in Ireland—never, however, called Picti. There does not seem to have been any difference in language and customs between these Irish Cruithnig and the rest of the people of Ireland, at least in historic times. They were probably early invaders from Britain belonging to the Pictish race.

The Picts are first mentioned in connection with the campaigns of Constantius Chlorus in Britain, in 296 and 306. Caledonia is the name given by Tacitus to Scotland N. of the Firths of Forth and Clyde, and he describes the Caledonians as a noble race of barbarians, who fight in chariots as well as on foot, with long swords and short shields, and whose fair red hair and large limbs argued a German origin. Ptolemy (120) places 14 tribes in Tacitus's Caledonia, inclusive of the Caledonians themselves, and the more E. 10 of these may be claimed as Picts. So troublesome were these Northern tribes to the Roman province that in 208 the Emperor Severus came to Britain and vainly attempted their subjugation. The contemporary historians mention only two tribes N. of the Forth and Clyde wall—the Mæatæ and the Caledonii—and Tacitus's noble barbarians appear in their pages but squalid savages, having no cities, knowing no agriculture, possessing wives in common, and tattooing their bodies with pictures of all kinds, to show which "they wear no clothing," says Herodian. Yet they had chariots and weapons as described by Tacitus, with dagger and peculiarly knobbed spear. One hundred years later the Caledonians and other Picts, as already said, were encountered by Constantius, and still 50 years later they harassed the Roman province (360) now in company with the

Picts

Scots, who are first mentioned at this date, and who appeared as great sea-wanderers, starting from Ireland and Scotland both, it would seem, and attacking the whole seaboard of the province, especially Wales. The Picts and Scots were helped in this "continual vexing" of the Britons by the Saxons and Atecotti. Theodosius the elder in 369 subdued these Northern foes and restored the district between the walls to Roman Britain, and the usurper Maximus signalized his assumption of power in 383 by an energetic campaign against the Picts and Scots. During the next quarter of a century the Romans were losing their hold on Britain, and their Northern foes pressed on the province with great persistence. They burst on the Romanized Britons with more fury than ever, and the calling in of the Saxons against the Picts and Scots made the last state of the Britons worse than their first.

The Southern Picts were converted to Christianity by St. Ninian (about 400), and the Northern Picts over a century and a half later by St. Columba. Bede also notes the system of succession among the Picts, whereby the reigning monarch was succeeded not by his son, but by either his brother or his sister's son, descent being counted through the females.

The year 839 saw a great defeat and slaughter of the Picts by the Danes, with confusion once again, from which emerged in 844 Kenneth MacAlpin, the Scot, as king over both nations, henceforward not to be disunited. Many things contributed to the overthrow of the Pictish kingdom, such as it was, and of the Pictish language; the disunion, physical and otherwise, between Northern and Southern Picts; the rule of female succession which allowed Angles, Britons, and Scottish princes to rule in right of their mothers, with the consequent degradation of marriage which matriarchy implies; and the superior culture of the Scots, Christian and literary. Nor must it be forgotten that we really do not know much about the isles and W. coast N. of Argyll, nor indeed of the counties N. of Inverness, from the time of Brude MacMailchon till the Norsemen came. It is quite certain that the Scots colonized these very early, and had, indeed, established themselves in Perthshire. Aidan, the son of Gubhran, makes expeditions to Orkney, and fights the Picts and defeats them on the Forth, or even farther E., in Mearns. This aggressive energy, combined with the other facts of the situation above enumerated, would easily enable the Scots to supersede the Picts in power and language.

The Picts, whatever traces they show of a non-Aryan racial element, with its consequent survival of lower ideas of marriage

laws, spoke a Celtic language belonging to a branch of Celtic allied to the Cymric, but dialectically different from the Welsh of Bede's time; and that this dialect of the Galo-Cymric stock was a wave of Celtic speech from the Continent previous to the Gaulish which held England when Cæsar entered Britain.

Picts' Houses, the name popularly given in many parts of Scotland to the rude underground buildings, more commonly and accurately called earth houses. The brochs are also sometimes called Pictish towers.

Picts' Work. See CATRAIL.

Picul, a Chinese weight of $133\frac{1}{3}$ pounds. It is divided into 100 catties, or 1,600 taels; also called tan.

Picus, an old sylvan deity in Italy, who was represented with the head of a woodpecker, and presided over divination. Also the scientific name of a genus of woodpeckers.

Pidavro. See EPIDAUROS.

Pidgin, Charles Felton, an American statistician; born in Roxbury, Mass., Nov. 1, 1844. He invented many machines for the mechanical tabulation of statistics, among them the electric adding and multiplying machine, addition register, and typewriter tabulator. His principal novels are: "Quincy Adams Sawyer" and "Mason's Corner Folks" (1900), and "Blennerhasset" (1901). He also composed several musical works, among them "Cambyzes," a grand opera, and "Peck's Bad Boy," a musical comedy.

Piedmont, or **Piemont**, a former Italian principality, which now forms the N. W. part of the kingdom of Italy; is by the Alps separated from Switzerland on the N. and from France on the W.; on the E. lies Lombardy, and on the S. Liguria and Genoa. It included the duchy of Monferrat and part of the old duchy of Milan, and now embraces the provinces of Alessandria, Cuneo, Novara, and Turin, and covers 11,389 square miles, with a pop. (1900) of 3,398,794. From the end of the 12th century the name Piedmont was used as a collective title for the territories ruled over by the House of Savoy on the E. side of the Graian and Cottian Alps.

Piepowder Court, in England, an ancient court held in fairs and markets to administer justice in a rough and ready way to all comers, called also the Court of Dusty Foot. Its jurisdiction seems to have been confined mostly to petty vagabonds, peddlers, and other wanderers. The court has long been obsolete, its jurisdiction merged in the Court of Petty Sessions.

Pier, a detached pillar or wall supporting the ends of adjoining trusses or spans,

or the springers of adjacent arches. Also an upright projecting portion of wall, similar to a pilaster, throwing the intervening sunken portions into panel. Also a buttress. Also a mole or jetty extending out from the land into the water, adapted to form a landing place for passengers or merchandise from ships which float in the deep water alongside the pier or wharf. They are variously constructed. Some are founded on piles, with cross timbers, braces, and sheathing; floor timbers afford a road for the traffic. The wooden structure is sometimes filled up with stone, like a dike; at other times it is of the nature of trestle work.

Pierce, Franklin, an American statesman, 14th President of the United States; born in Hillsboro, N. H., Nov. 23, 1804. He was educated in the schools of his native State and at Bowdoin College, where he studied in company with Longfellow, Hawthorne, and Prentiss, graduating in 1824. He was admitted to the bar in 1827, and in 1829 was elected to the New Hampshire Legislature. In 1833 he entered Congress, serving four years, and in 1837 was elected to the United States Senate, being the youngest member of that body, that contained such men as Webster, Clay, Calhoun, Benton, Buchanan, and Silas Wright. In 1842 he resigned from the Senate and retired to private life, declining several public offices tendered him. During this period he engaged in public debate with John P. Hale on the slavery question, Pierce advocating the constitutional right of that institution. In 1846 he enlisted for the Mexican War, was appointed brigadier in the volunteer army, and led his brigade in the battles of Contreras and Cherubusco. After the war he continued the practice of law, frequently advocating the political principles of the Democratic party in public, and favoring the compromise measures of 1850, including the Fugitive Slave Law. In 1852 he was nominated for the presidency on the 49th ballot, by the Democratic National Convention, and was elected by an electoral majority over General Scott of 254 to 42. During his administration the Missouri Compromise was repealed, a reciprocity treaty for trade with the British American colonies was made; a treaty with Japan was established; and the Mexican boundary disputes settled. After his term expired, failing of a renomination, he traveled abroad for three years, and, returning, lived thereafter in retirement at Concord, where he died, Oct. 8, 1869.

Pierce, Henry Niles, an American clergyman; born in Pawtucket, R. I., Oct. 19, 1820. He spent many years in the West as a missionary, and was consecrated Protestant Episcopal Bishop of Arkansas in 1870, being the first incumbent and hold-

Pieria

ing the office for 25 years. He published many essays, sermons, and reviews; and a volume of poems, "The Agnostic," etc. (1884). He died Sept. 5, 1899.

Pieria, a coast district of ancient Macedonia, at the base of the Olympus, and between the Peneus and Haliacmon. It was the fabled birthplace of the Muses and of Orpheus.

Pierpont, Francis Harrison, an American statesman; born in Monongalia co., Va. (now W. Va.), in 1815; was graduated at Allegheny College and admitted to the bar. He was an elector on the Whig ticket of 1848. At the beginning of the Civil War he became governor of the counties of Virginia that remained loyal to the Union, and were organized as the State of West Virginia in 1861; was then governor of all the loyal counties in Eastern Virginia; and from June, 1863, till May, 1865, was chief executive of the present Virginia. He died in Pittsburg, Pa., March 24, 1899.

Pierpont, John, an American poet; born in Litchfield, Conn., April 6, 1785. He became a Unitarian clergyman and served as chaplain in the Civil War. Among his works is "Airs of Palestine, and Other Poems" (1840). One of his best known poems is "Warren's Address at the Battle of Bunker Hill." He died in Medford, Mass., Aug. 27, 1866.

Pierrepoint, Edwards, an American diplomatist; born in North Haven, Conn., March 4, 1817; was graduated at Yale in 1837, and at its Law School in 1840; became a member of the Ohio bar, and after five years removed to New York city. He was elected a judge of the Superior Court of New York in 1857; was appointed a colleague of Gen. John A. Dix to try the prisoners of war confined in various prisons and forts of the country in 1862. He was one of the counsel for John H. Surrat, indicted for complicity in the murder of President Lincoln; in 1875 became attorney-general of the United States in Grant's administration; and in the following year was appointed United States minister to Great Britain. He tried many famous cases during his professional career, and was noted as an orator. He died in New York city, March 6, 1892.

Pierrot, a comic character on the French stage, dressed like the harlequin, and playing the part of a cunning but cowardly rogue.

Pierson, Henry Hugh, an English composer; born in Oxford, England, in 1816; in 1844-1845 filled the chair of music in Edinburgh, and from 1846 lived in Germany. Among his works were the music for the second part of Goethe's "Faust," the operas

Pigafetta

"Leila" and "Contarini," and the oratorios "Jerusalem" and "Hezekiah." He died in Leipsic, Jan. 28, 1873.

Pietà, in painting and sculpture, a representation of the Virgin, embracing the dead Christ. In St. Peter's at Rome is a Pietà by Michael Angelo.

Pietermaritzburg, or **Maritzburg**, capital of the province of NATAL (*q. v.*). It occupies a fine situation near the Umgeni river, 54 miles N. of Durban. The streets are regular, and the water supply is abundant. It is the seat of government, headquarters of the military, and its municipal affairs are managed by a mayor and town council. The chief buildings are the government house and the office of the colonial secretary. It takes its name from its founders, the Boer leaders Pieter Retief and Gert Maritz. There is railway connection with Durban, and also to the borders of the Orange River Colony and the Transvaal. The River Colony railway was begun in November, 1889. Pop. (1907) 32,000.

Pietist, a member of a party of reformers in the Lutheran Church in the 17th century. The leader of the movement, an Alsatian, Philip Jacob Spener (1635-1705), when pastor in Frankfort, in 1670, was in the habit of holding private gatherings in which the Scriptures were explained practically rather than dogmatically, and, this movement spreading, Spener published a work, "Three Desirable Things of Religion," in which he deplored the incessant preaching of dogma, advocated reform in education, and formulated the opinion that a virtuous life was of more importance than a correct creed. After Spener's death the executive interfered, and proscribed the open profession of Pietism, so that its professors had no opportunity of forming a new sect.

Piet Paaltjeus. See HAVER-SCHMIDT, FRANÇOIS.

Pietra dura, a species of inlaid work composed of hard stones, such as agate, jasper, chalcedony, carnelian, and lapislazuli, set in a slab of marble, generally black. The marble is worked to a thickness not much exceeding an eighth of an inch; the design is drawn upon it and cut out with the saw and file. The hard stones, formed to the desired shapes by the usual processes of gem-cutting, are accurately fitted into the spaces thus cut out, and the whole is attached as a veneer to a thicker slab.

Piezometer, an instrument for determining the compressibility of liquids, and the degree of compression under any given weight; one form is used in water mains to show the pressure of the fluid at any point.

Pigafetta, Antonio, an Italian navigator; born in Vicenza, in 1491; accompanied

Pigault-Lebrun

Magellan in the first circumnavigation of the globe (1519-1522). He kept a journal of the voyage, of which a complete edition was first published only in 1800. He died in Vicenza in 1535.

Pigault-Lebrun (pē-go"luh-brüŋ'), the pseudonym of ANTOINE P. DE L'ÉPINOY, a French author; born in Calais, France, April 8, 1753. He wrote more than 70 volumes of stories, among them "The Child of the Carnival" (1792), "The Barons of Felsheim" (1798), "Spanish Madness" (1801); and several comedies, as "The Pessimist" (1789), "Rivals of Themselves" (1798), "Love and Reason" (1799). He wrote also "Literary and Critical Miscellanies" (2 vols. 1816). He died in La Celle Saint Cloud, July 24, 1835.

Pigeon. See CARRIER PIGEON.

Pigeon English, the dialect used by English and American residents in China in their dealings with the native traders. It is a conglomeration of English and Portuguese words in Chinese idiom.

Pigeon Pea, the fruit of the leguminous shrub *Cajanus indicus*, a native of India, but now cultivated in tropical Africa and America. In India the pigeon pea forms a pulse of general use; called also Angola pea and Kongo pea.

Pig Iron, iron in oblong masses, or "pigs," as turned out by the smelting furnace. In July, 1898, manufacturers furnished to the American Iron and Steel Association complete statistics of the production of all kinds of pig iron in the United States for the first half of the years 1897 and 1898; also complete statistics of the stocks of pig iron on hand and for sale June 30, 1898, as follows:

The total production of pig iron in the first half of 1898 was 5,909,703 gross tons, against 4,403,476 tons in the first half of 1897 and 5,249,204 tons in the second half. The production in the first half of 1898 was not only the largest half-yearly production in our history, but it was very much the largest, the next largest half-yearly production being in the second half of 1895, when 5,358,750 tons were made. The next largest half-yearly production was in the second half of 1897. It will be noticed that the production of the first half of the present year was at the rate of almost 1,000,000 tons a month. It was 226,374 tons larger than our total production in 1886, which was then regarded as a remarkable record.

The production of Bessemer pig iron in the first half of 1898 was 3,781,314 gross tons, against 2,495,978 tons in the first half of 1897 and 3,299,606 tons in the second half. The production of basic pig iron in the first half of 1898 was 337,485 tons, against 821,610 tons in the first half of 1897 and 274,781 tons in the second half. The

Pig Iron

production of spiegeleisen and ferromanganese in the first half of 1898 was 109,641 gross tons, against 80,622 tons in the first half of 1897 and 93,073 tons in the second half.

Only 19 States made pig iron in 1897 and in the first half of 1898, the smallest number recorded in the history of the American Iron and Steel Association, and the smallest number since about 1830. The tendency of the pig iron industry toward consolidation and centralization in the most favored localities explains the complete abandonment of the industry in many States.

Notwithstanding the greatly increased production of pig iron in the first half of 1898 the following States made less pig iron in that half year than in the second half of 1897: Massachusetts, Connecticut, New York, New Jersey, Maryland, Virginia, Georgia, Texas, and Tennessee. All the other States increased their production. The greatest increase was made by Pennsylvania, 285,167 tons, and the next greatest by Ohio, 260,024 tons. Illinois increased her production 69,012 tons. Allegheny co., Pa., increased its production in the first half of 1898 only 14,325 tons. The Shenango valley increased its production 100,954 tons, and the increase in the Mahoning valley was 96,100 tons. The whole number of furnaces in blast on June 30, 1898, was 183, against 191 on Dec. 31, 1897. The number out of blast on June 30 was 233.

The statistics of unsold stocks of pig iron on June 30, 1898, showed a small decrease on the unsold stocks on Dec. 31, 1897. On June 30 the stocks which were unsold in the hands of manufacturers or their agents, and which were not intended for their own consumption, amounted to 571,577 gross tons, against 656,489 tons on Dec. 31, 1897. These figures do not include pig iron sold and not removed from the furnace bank. The principal decreases in pig iron stocks were in New York, Pennsylvania, Virginia, Ohio, Michigan, and Wisconsin. The shrinkage in charcoal stocks alone was 51,298 tons. There was a similar decrease in bituminous stocks, but an increase in anthracite.

Included in the stocks of unsold pig iron on hand on June 30, 1898, were 73,241 tons in the yards of the American Pig Iron Storage Warrant Company, which were yet under the control of the makers, the part in these yards not under their control amounting to 184,759 tons, which, added to the 571,577 tons above mentioned, makes a total of 756,336 tons which were on the market at that date, against a similar total of 874,978 tons on Dec. 31, 1897. The total stocks in the above named warrant yards on June 30, 1898, amounted to 258,000 tons, against 275,800 tons on Dec. 31, 1897.

The total production of pig iron by States in the calendar year 1908 was as follows:

Pigment Cell

State.	Furnaces in blast Dec. 31, 1908.	Production, including spiegeleisen and ferro- manganese, in long tons.
Pennsylvania	87	6,987,191
Ohio	39	2,861,325
Illinois	14	1,691,944
Alabama	25	1,397,014
New York	15	1,019,495
Virginia	10	320,458
Tennessee	12	290,826
Colorado	3 }	313,071
Missouri	2 }	
Maryland	2	183,502
New Jersey	3	225,372
Wisconsin	4 }	
Minnesota	1 }	148,938
Michigan	8	348,096
West Virginia	1	65,551
Kentucky	2	45,096
Georgia	2 }	24,345
Texas	0 }	
Connecticut	2 }	13,794
Massachusetts	1 }	
Indiana	3	
Total.....	236	15,936,018

*Tonnage included with Michigan.

Owing to the general business depression the production in 1908 showed a decrease of 9,845,343 tons from that of the previous year, which was the largest on record (25,781,361 tons), and was also less than that of any year since 1901. The total number of blast furnaces in 1908 was 459, but 223 of these were out of blast at the end of the year. The approximate value of the 1908 output at the furnaces was \$254,321,000. The available iron-ore supply was estimated at 4,478,150,000 long tons; unavailable, 75,116,070,000.

Pigment Cell, a small cell containing coloring matter, as in the choroid coat of the eye.

Pigments, materials used for imparting color, especially in painting, but also in dyeing or otherwise. The coloring substances used as paints are partly artificial and partly natural productions. They are derived principally from the mineral kingdom; and even when animal or vegetable substances are used for coloring they are nearly always united with a mineral substance (an earth or an oxide). In painting, the colors are ground, and applied by means of some liquid, which dries up without changing them. The difference of the vehicle used and the method of employing it have given rise to the modes of painting in water colors, oil colors, in fresco, in distemper, etc. For oil painting, mineral substances are more suitable than "lakes" prepared with minerals, because the latter become darker by being mixed with oil. The "lake" colors have tin or alum for their basis, and owe their tint to animal or vegetable coloring substances. Indigo is a purely vegetable color, as is also blue-black, which is obtained from burned vine twigs. Ivory black is a purely animal color, being nothing but burned ivory. In staining

Pike

porcelain and glass the metallic colors which are not driven off by heat and are not easily changeable are used. See LAKES.

Pigmy. See PYGMY.

Pignerol. See PINEROLO.

Pignotti, Lorenzo (pēn-yot'tē), an Italian writer; born in Figlina, Italy, in 1739. Among his writings are poems: "On the Grave of Shakespeare" (1778); "The Shade of Pope" (1791). He wrote a book of "Fables" (1779), which were very popular; and a "History of Tuscany" (9 vols. 1813). He died in Pisa, Italy, in 1812.

Pika, the calling hare, *Lagomys*, an animal nearly allied to the hares, and forming the family *Lagomydæ*. It is found in Russia, Siberia, and North America, and is remarkable for the manner in which it stores up its winter provision, and also for its voice, the tone of which so much resembles that of a quail as to be often mistaken for it.

Pike, a military weapon, consisting of a narrow, elongated lance-head fixed to a pole or a simple spike of metal. The end of the staff had also a spike for insertion in the ground, thus allowing a musketeer to keep off the approach of cavalry while attending to his other arms. It is now superseded by the bayonet. Also, any individual of the genus *Esox*, especially *Esox lucius*, the common pike. It is one of the larger fresh-water fishes, sometimes attaining a length of five or six feet, and much esteemed for food. Pikes are extremely voracious, and, though small fish and frogs form their staple food, the remains of ducks and geese have been found in their stomachs. They are very long-lived; and on the evidence of rings, which in the Middle Ages were sometimes put in their gill-covers, it has been maintained that some individuals have been captured at the mature age of 250 years. They commence to spawn at three years old; the ova are deposited in March, and the spawning season lasts about three months. The pike are migrants, and have been known to travel overland. The head and back are olive-brown, sides paler, belly silvery white; body mottled with roundish spots, which sometimes form cross bars on tail. The English name has reference to the elongated form of the fish, or the shape of its snout.

Pike, Albert, an American writer; born in Boston, Mass., Dec. 29, 1809; entered Harvard, 1826, but did not graduate, leaving to become principal of Newburyport Grammar School. He set out in March, 1831, in a caravan for Santa Fé; after a short time he devoted himself to school teaching and newspaper work and became a lawyer in Arkansas, where he revised the statutes. He was attorney for the Cherokees, receiving at one time a fee of \$100,000.

Pike

In 1839 his "Hymns of the Gods" was published. He also wrote works on Masonry. He served in an Arkansas regiment during the Mexican War, and in the Civil War organized some Indian regiments which he led in the battles of Pea Ridge and Elkhorn. After the war he was editor of the Memphis "Appeal" till 1868. He died in Washington, D. C., April 3, 1891.

Pike, Mrs. Mary Hayden (Green), an American novelist; born in Eastport, Me., Nov. 30, 1825. She will be best remembered as the author of "Ida May" (1854), a novel dealing with slavery and Southern life, which had a large sale. She also published "Caste" (1856), "Bond and Free" (1858), and "Agnes."

Pike, Zebulon Montgomery, an American military officer; born in Lamberton, N. J., Jan. 5, 1799; was appointed an ensign in his father's regiment in 1779; conducted an expedition sent by the government to trace the Mississippi to its source in 1805; also made explorations in Louisiana Territory, discovering Pike's Peak and reaching the Rio Grande in the course of his travels. In 1813 he was promoted Brigadier-General, and on April 13 of that year while in command of the attack on York (now Toronto), in Upper Canada, was killed.

Pike Perch, *Lucioperca*, a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other fresh-water fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh waters of North America, such as the Great Lakes, the Upper Mississippi, and the Ohio.

Pike's Peak, a peak of the Rocky Mountains, in Colorado, 65 miles S. of Denver, discovered by Captain Pike, U. S. A., in 1806. It is situated in lat. 38° 50' N., and lon. 105° 2' W., and rises to a height of 14,147 feet. On its summit is one of the highest meteorological stations in the world; while at the base, at Colorado Springs, there is a low level station. There is a railway to the top, 9 miles long (4½ miles of curves), with a maximum gradient of 1 in 4.

Pilaster, a square column, generally attached to a wall, as an ornamental support to an arch, etc., and seldom projecting more than one-fourth or one-third of its breadth from the wall.

Pilate, Pontius, a Roman ruler, who became governor of Judæa, A. D. 26. He commanded in that country 10 years. The Jews brought Jesus Christ before Pilate, who, perceiving that envy and malice occasioned their charges, would have scourged the prisoner and dismissed him, but being threatened with the wrath of Cæsar, Pilate

Pile

delivered Jesus, whom he pronounced innocent, to be crucified. He is said to have subsequently treated the Samaritans with great cruelty, for which he was recalled by Tiberius, and banished to Gaul, where he slew himself, A. D. 37 or 38.

Pilatus, Mount, an isolated mountain at the W. end of the Lake of Lucerne, rising opposite the Rigi. The lower half is clothed with wood and meadow, where in summer over 4,000 head of cattle are pastured; the upper portion is a mass of bare and jagged peaks, rising in the Tomlishorn to 6,998 feet. Below the summit lies Lake Pilatus. On two of the peaks there are hotels; and since 1889 there has been a tooth-and-rack railway from Alpnach to the top, whence there is a splendid view of the Bernese Alps. In 1891 a steel tower was undertaken, to be 300 feet in diameter at its base and 840 feet high, and so pierce any enveloping cloud.

Pilau, or Pillaf, a dish common in Turkey, Egypt, Syria, and India, consisting generally of rice, thoroughly boiled, drained, and gently stirred with butter, pepper, and finely-chopped onions. For the tables of the wealthy, fowls, lamb, mutton, shreds of ham or bacon, variously cooked, but always well boiled or roasted, are placed on the top of the rice, and served up with it.

Pilchard, *Clupea pilchardus*, an important food fish, found on the coast of Northwestern Europe. It abounds also on the coast of Portugal and in the Mediterranean. It is a thicker and smaller fish than the herring; the upper part of the body is bluish-green, belly and sides silvery-white. It may be easily recognized by the radiating ridges on the operculum, which descend toward the sup-operculum.

Pilcomayo, a river in South America, which rises in Bolivia, on the E. declivities of the Andes, and falls into the Paraguay, near Asuncion, after forming the boundary between Paraguay and the Argentine Republic. Its entire length is between 1,500 and 1,600 miles. On account of its shallowness during the dry season and the great current in its narrow parts it does not appear likely to become usefully navigable.

Pile, in electricity, a series of elements thus constituted: First, a disk of copper resting below on a wooden framework, and above in contact with a disk of cloth moistened by acidulated water or brine; above this again a disk of zinc. As frequent a repetition of this series as is desired (the disk of zinc, however, being always the highest) will constitute a more or less tall column like a pile, whence the name. The first having been planned and made by Volta, the appellation generally given is voltaic pile. Also, any instrument or

Pile

mechanism for producing voltaic electricity, even though it do not take the form of a pile.

Pile, a beam or timber driven into treacherous ground to form a foundation for a structure, or to form part of a wall, as of a cofferdam or quay. Piles are named according to their structure, and the most important kinds are described under the respective qualifying terms — *e. g.*, false pile. In heraldry, one of the lesser ordinaries, triangular in form and issuing from the chief with the point downward. When borne plain it should contain one-third of the chief in breadth, and if charged two-thirds.

Pilgrim, a traveler, a wanderer, a stranger; specifically, one who travels to a distance from his own land to visit some holy place or shrine, or to pay his devotions at the shrine of some saint. For the distinction between a pilgrim and a palmer, see PALMER. In Scripture, one living in this world, but who does not look on it as his home; one who looks forward to life in a heavenly country. (Heb. xi: 13.)

Pilgrimage, a journey undertaken by a pilgrim; specifically, a journey to some distant place, sacred and venerable for some reason, undertaken for devotional purposes. In Scripture, the journey of human life. (Gen. xlvii: 9.) Pilgrimages are an essential part of the Hindu and Mohammedan systems, and the visits to Jerusalem three times a year of the Jewish race were of the nature of pilgrimages. The Empress Helena led the way in Christian pilgrimages by visiting Jerusalem in A. D. 326. Once commenced, they continued through the whole Middle Ages, and then somewhat flagged, but have recently been revived.

Pilgrimage of Grace, an insurrectionary movement in the N. of England, in 1536-1537, consequent upon the proceedings of Henry VIII. in regard to the Church. The insurgents demanded the fall of Cromwell, redress to the Church, and reunion with Rome. Mustering to the number of 30,000, they marched on York, and within a few days were masters of England N. of the Humber. Henry temporized, promising a free Parliament at York; but when the insurgents returned home all concessions were revoked, and a renewal of the revolt was suppressed with great vigor. Many perished by the block, the gibbet, and the stake.

Pilgrim Fathers, the name given to 102 Puritans, who sailed in the "Mayflower," from Plymouth, on Sept. 6, 1620, to seek in America the religious liberty denied them in England. Landing on Plymouth Rock, they, on Dec. 25, 1620, founded a colony, which became the germ of the New England States.

Pillory

Pillaf. See PILAU.

Pillar, in anatomy, a pillar-like fold; as the anterior and the posterior pillars of the fauces; or a diverging muscular fiber; as, the pillars of the abdominal ring; the pillars of the diaphragm. In architecture, a kind of irregular column, round and insulate, but deviating from the proportion of a just column. The term pillar is more usually applied to Gothic architecture than to the Classical. Pillars are used for support or ornament, or as a monument or memorial. In horology, one of the posts in a watch or clock which separate and yet bind together the plates. In mining, the post or mass of coal or ore left for the support of the ceiling of a mine. The worked space is called room. Thus, pillar and room is equivalent to the usual technical phrase, post and stall. In shipbuilding, a vertical post beneath a deckbeam.

Pillar of On. See HELIOPOLIS.

Pillar Saints, an English rendering of the Greek *stylitai*, the name of a class of hermit ascetics, chiefly Syrian, who crucified the flesh by living on the summit of pillars in the open air. The most noted was Simeon called Stylites.

Pillar of Hercules, The, Calpé (now Gibraltar rock), and Abyla, opposite to it in Africa, which Greek story says were torn asunder and separated by Hercules about 1220 B. C. The Mediterranean was previously, like the Caspian, without connection with the ocean, hence the name *Mediterraneum Mare* (Inland Sea).

Pillnitz, or **Pilnitz**, the ordinary summer residence of the royal family of Saxony, in a beautiful situation on the Elbe, 5 miles S. E. of Dresden. The palace embraces three main buildings or "castles," and is surrounded with beautiful parks and gardens. Here, on July 20, 1791, a meeting of princes began the consideration of an arrangement which led to the Declaration of Pillnitz, according to which Austria and Prussia agreed to take common action on behalf of the royal family of France against the Republicans.

Pillory, formerly a common instrument of punishment for persons convicted of forestalling, use of unjust weights, perjury, forgery, libel, etc. It consisted of a frame of wood, erected on a pillar or stand, and furnished with movable boards, resembling those of the stocks, and holes through which the offender's head and hands were put. In this position he was exposed for a certain time to public view and insult. The use of the pillory was abolished in France in 1832, in England in 1837, and in the United States in 1839.

Pillow

Pillow, Fort, a defensive work, erected by the Confederates during the Civil War, about 40 miles N. of Memphis, Tenn., and abandoned by them, June, 1862, and occupied by the Union forces till April, 1864, when it was taken by the Confederates under General Forrest, and the garrison killed.

Pillow, Gideon Johnson, an American military officer; born in Williamson co., Tenn., June 8, 1806; served with distinction during the Mexican War, first as a Brigadier-General and later as a Major-General of volunteers. In the Civil War he was appointed a Brigadier-General in the Confederate army; was second in command at Fort Donelson in February, 1862, and with his chief, Gen. John B. Floyd, escaped, leaving General Buckner to surrender the fort to General Grant. He died in Lee co., Ark., Oct. 6, 1878.

Pills, medicines made up in globules of a convenient size for swallowing whole, the medicine being usually mixed up with some neutral substance such as breadcrumbs, hard soap, extract of liquorice, mucilage, syrup, treacle, and conserve of roses. The coverings are liquorice powder, wheat flour, fine sugar, and lycopodium. In many cases pills are now enameled or silvered, which deprives them of most of their unpleasantness. Pills are a highly suitable form for administering medicines which operate in small doses, or which are intended to act slowly or not to act at all till they reach the lower intestines, and in some other cases.

Pilot, one who, being properly qualified by experience, and having passed certain examinations, is appointed by the competent authority to conduct ships into or out of harbor or along particular coasts, channels, etc., at a certain fixed rate, depending on the draught of the vessel and distance. The pilot has the entire charge of the vessel in the pilot's water and is solely responsible for her safety.

Pilot Fish, *Naucrates ductor*, a small pelagic fish, about a foot long, of bluish color, marked with from five to seven broad, dark, vertical bars. It owes its scientific and popular English name to its habit of keeping company with ships and large fish, generally sharks. The connection between this fish and the shark has been accounted for in various ways; but it is probably a purely selfish one on the part of the pilot fish, which obtains a great part of its food from the parasitic crustaceans with which sharks and other large fish are infested, and from the small pieces of flesh left unnoticed when the shark tears its prey. The pilot fish is never, so far as is known, attacked by the shark; but that is probably

Piman

because the smaller fish is too nimble for the larger one. Pilot fish often accompany ships into harbor.

Pilot Knob, a remarkable hill in Missouri, about 86 miles S. W. of St. Louis. It is nearly 500 feet high, and is composed almost entirely of magnetic iron ore.

Piloty, Karl von, a German painter; born in Munich, Bavaria, Oct. 1, 1826; he studied at the Munich Academy, and became manager of the lithographic institute founded by his father. He improved his knowledge of art by travels through Belgium, France, and England. His first painting, "The Dying Mother and the Nurse," attracted attention to his merits. After Piloty was made professor in 1858 he was quickly surrounded by a crowd of enthusiastic students, some of whom have since been acknowledged masters. On the death of Kaulbach, the direction of the academy was assigned to Piloty. Among his noted works are, "The Assassination of Wallenstein," "Nero Amid the Ruins of Rome" (1864); "Columbus Discovering America" (1865); "The Death of Julius Cæsar," "Mary Queen of Scots Listening to her Death-Warrant," "Thusnelda in the Triumph of Germanicus" (1872). He died in Munich, July 21, 1886.

Pilpay, or Pilpai. See BEDPAI.

Pilsen, the second town of Bohemia; in a fertile and beautiful valley, 52 miles S. W. of Prague. There are numerous active industries, producing building materials, machinery, metal work, porcelain, spirits, liquors, leather, etc. In the neighborhood are mines of iron, alum, vitriol, coal, and sulphuric acid. But the town is most widely known from giving its name to a popular beer. The town was stormed by Zizka in the Hussite war and by Count Mansfield in the Thirty Years' War (1618); it was Wallenstein's headquarters in 1633-1634. Pop. (1901) 68,079.

Pim, Bedford Clapperton Trevelyan, an English naval officer; born in Biddeford, England, June 12, 1826; entered the British navy in 1842; took part in the Franklin search expedition in 1852; commanded a gunboat on the Baltic during the Crimean War, and in 1860 was sent to Nicaragua to fight the filibusters. He was promoted captain in 1868 and retired in 1870. He was admitted to the bar in 1873 and was a member of Parliament 1874-1880. He wrote: "The Gate of the Pacific" (1863); "Dottings on the Roadside in Panama, Nicaragua and Mosquito" (1869); "The War Chronicle" (1873); etc. He died in London, Oct. 1, 1886.

Piman, a linguistic stock of North American Indians who occupy a vast area extending over Southern Arizona and

Pimelodus

Northwestern Mexico. They number about 80,000.

Pimelodus, a genus of *Siluridæ* having the adipose fin well developed; dorsal and anal short; the former with pungent spine and six rays; barbels six; palate edentulous; ventrals six-rayed, inserted behind the dorsal. Forty species are known from South America, the majority of small size and plain coloration. Two species (*P. platychir* and *P. balayi*) are from West Africa.

Pimpernel (*Anagallis*), a genus of plants belonging to the natural order *Primulaceæ*. The *A. arvenis*, or field pimpernel, a beautiful annual, is commonly known as the "shepherd's or poor man's weather glass," from the fact that its flowers do not open in rainy weather. The bog pimpernel (*A. nagallis tenella*) grows in the drier parts of marshes. The blue and lilac varieties of the *A. collina*, originally a native of South Africa, have been introduced into gardens in Great Britain, where they have a fine effect. The water pimpernel is the *Veronica A.*; the yellow pimpernel, *Lysimachia nemorum*.

Pin, a piece of wood, metal, etc., generally pointed and used for fastening separate articles together, or as a support; a peg, a bolt. Also a small piece of wire, generally brass, headed and pointed, used as a fastening, etc., for dress, or for attaching separate pieces of paper, etc., or as an ornament, for which purpose they have been employed since antiquity.

Pins were made by hand of metal in the 16th century, and were very costly. Before that time small skewers of ivory or wood were used. The first pin-making machine was made in 1824 by an American living in England. Many improvements have since been introduced. The chief features of the process consist in the preparation and feeding of the wire to a machine which cuts off the sections, and forms the heads by a punch; next feeding the pins into grooves on the face of a revolving wheel which presents them to files for the formation of points, and to an emery band which smoothes them; they are then electroplated with tin, afterward receiving a final polish in a revolving tub. The pins are carried to the "sticker," where they fall from a hopper on an inclined plane in which are a number of slits. They catch in these slits, and, hanging by their heads, slide down the incline to the apparatus which inserts them in the paper, into which an entire row is stuck at once, the machine also folding the papers.

Pina Cloth. See PINEAPPLE FIBER FABRICS.

Pinckney

Pinacothek, or **Pinakothek**, a name sometimes applied in Germany to galleries of art, especially collections of paintings. The Pinacothek formed at Munich by Louis I. of Bavaria is particularly famous.

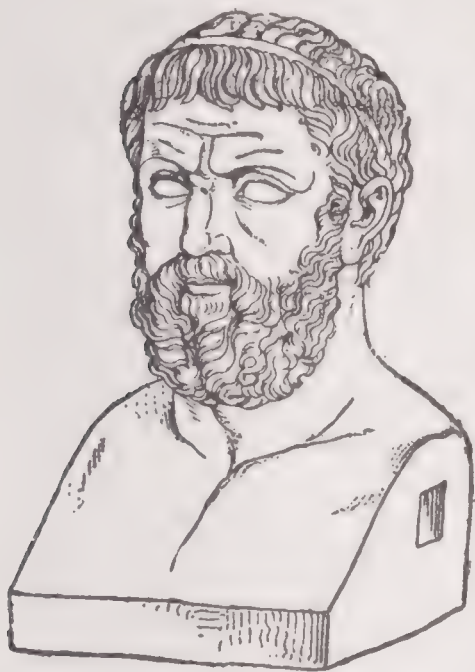
Pinchbeck (said to be so called from a Mr. Pinchbeck, of London, England, who, toward the close of the 18th century, resided in the neighborhood of the Strand, and manufactured a compound metal which had, to a certain extent, the appearance and luster of gold, though the counterfeit, as well as that in ormolu, or mosaic, could easily be detected by its weight being less than that of gold, its undefined and badly-worked edges, and its want of resonance), an alloy of copper and zinc; copper 5, zinc 1. It was formerly much used in the manufacture of cheap jewelry.

Pinckney, Charles Cotesworth, an American statesman; born in Charleston, S. C., Feb. 25, 1746. He was sent to England and educated at Westminster and at Christ Church, Oxford, read law at the Middle Temple, and studied for a while at the military academy in Caen, France. He afterward settled as a barrister at Charleston, S. C. He was Washington's aide-de-camp at the battles of Brandywine and Germantown, and afterward, as colonel, saw much active service, till 1780, when he was taken prisoner at the surrender of Charleston, and detained till the close of the war. A member of the convention that framed the Constitution of the United States (1787), he introduced the clause forbidding religious tests as a qualification for office. He declined the secretaryship of war in 1794, and of state in 1795; in 1796 he was sent as minister to France, but the Directory refused to receive him, and he had to quit the country. It was while on this mission that, when it was intimated that peace might be granted in return for a money payment, he made the reply, "Millions for defense, but not a cent for tribute." In 1800-1808 he was thrice an unsuccessful Federalist candidate for the presidency. He died Aug. 16, 1825.

Pinckney, Thomas, an American diplomatist, brother of Charles C.; born in Charleston, S. C., Oct. 23, 1750. In the Revolutionary War as aide to General Lincoln he distinguished himself at the assault on Savannah and was severely wounded at Camden in August, 1780. He was governor of South Carolina in 1787-1789; United States minister to Great Britain in 1792-1794, and to Spain in 1794-1796; a Federalist candidate for the presidency in 1796; and member of Congress in 1797-1801. He died in Charleston, Nov. 2, 1828.

Pindar

Pindar, the great Greek lyric poet; born in or near Thebes, in Bœotia, about 522 B. C. He was of a noble family, said to



PINDAR.

have been skilled in music, and he learned his father's art of flute playing. At Athens he was a pupil of Lasus of Hermione, and on his return he was assisted by the advice of his celebrated country women, Myrtis and Corinna, who were also his competitors at the public festivals. Pindar composed choral songs for

princes and states in all parts of Greece; for which, as was the custom, he received money and gifts. Yet he did not become a mere hireling, but maintained such a dignified position as befitted him as poet and man, and spoke truth fearlessly to all. He did not live at courts, nor take part in public affairs. Pindar excelled in all varieties of choral poetry, hymns to the gods, pæans, odes for processions, drinking songs, etc. But the only poems of his now extant are the "Epinikia, or Triumphal Odes," composed in celebration of victories at the great public games, the Olympian, Pythian, Nemean, and Isthmian. The praises of the victor, of his family, and his state, are intermixed with mythical narratives and sententious maxims and admonitions; and the odes—sublime, enthusiastic, and full of lofty thought and sentiment—are marked by an extraordinary variety of style and expression. No two odes have the same meter. Pindar attained the highest renown in his own age, and as a lyrical poet has no rival. When Thebes was destroyed by Alexander, the conqueror spared the house of Pindar. He died in 443 B. C.

Pindar, Peter. See WOLCOT, JOHN.

Pindaris, or Pindarrees, bands of freebooters or mercenary soldiers who, after the overthrow of the Mogul empire of India, grew (1804–1817) to be a formidable power in the Central Provinces, their headquarters being at Malwa. Hastings, to put an end to their depredations, gathered two armies (120,000 men in all) in 1817, and crushed them.

Pindemonte, Ippolito (pēn'dā-mon'tā), an Italian poet; born in Verona, Nov. 13, 1753. His first essays in verse were tragedies, which had little success; he then turn-

Pineal Gland

ed to lyric and descriptive poetry, and achieved a distinguished reputation. His works are: "Poems of the Fields" (1788); "Various Poems" (1798); "Epistles in Verse" (1805); a translation of Homer's *Odyssey* (1809–1822); "Discourses" (1819: Sermoni, after the manner of Horace's "Satires," called also Sermones). He died in Verona, Nov. 18, 1828.

Pindus, the ancient name of the principal mountain range of Northern Greece, forming the watershed of the country and the boundary between Thessaly and Epirus. It was, like Helicon and Parnassus, a seat of Apollo and the Muses.

Pine, *Pinus*, a genus of trees of the natural order *Coniferae*. The Linnæan genus includes all kinds of fir, larch, and cedar; but as now limited the genus *Pinus* is distinguished by monœcious flowers and woody cones with numerous two-seeded scales, the scales having an angular truncated apex. The leaves are linear and very narrow, of a very dark green color, growing in clusters or in pairs, and surrounded by scarious scales at the base. To this genus belong many noble and useful trees. They mostly grow in mountainous or other exposed situations, and their narrow leaves are admirably adapted to evade the force of winds, which produce in the tops of pines a peculiar sound, much noticed by the ancient poets, more soft and continuous than in trees of richer foliage. Most of the pines are more or less social, one kind often covering a considerable tract; some of them clothing the sides and unproductive sandy grounds such as the pine barrens of North America. Many species of pines, some of them very beautiful and very valuable, are found in North America. Besides those long known, and which are found in the States and colonies near the Atlantic, a number of the noblest species of this genus have, during the 19th century, been discovered in California and the N. W. parts of the Continent. The red Canadian pine (*P. resinosa*) is found from Canada to the Pacific, but does not reach far S. in the United States. It is the yellow pine of Canada and Nova Scotia.

Pineal Gland, in anatomy, a conical body of a dark gray color, located in the brain, immediately behind the posterior extremity of the third ventricle. It rests in a groove between the nates. Its base is turned forward toward the third ventricle, and its apex is directed downward and backward. It is connected to the inner surface of the thalami by fibers called the peduncles or habenæ of the pineal gland. In a cavity near its base is a mass of sabulous matter composed of phosphate and of carbonate of lime. It is found in the human species after seven years of age. It was called by Soemmering *cervulus*. Spen-

Pineapple

cer has demonstrated that it is a vestigial eye.

Pineapple, the *Ananassa sativa*. The leaves are hard and fibrous, with spiny edges. The flowers rise from the center of the plant, and are in a large conical spike, surmounted by spiny leaves called the crown. The conical spike of flowers ultimately becomes enlarged and juicy, constituting the pineapple, believed to be the finest of fruits. The first particular account was given by Oviedo, in 1535, and it was first cultivated in Holland. More than 50 varieties have been produced.



PINEAPPLE.

The plant grows in the S. portion of the United States and in Hawaii. In the islands they sometimes reach the weight of 17 pounds, though the average weight is six. Since 1883 there have been large exports of this fruit from the various islands, and the production is increasing.

Pineapple Fiber Fabrics, various kinds of textiles made from the leaf of the pineapple. According to the report of the United States Department of Agriculture both the wild and the cultivated plants of this description yield fiber which when spun surpasses in point of strength, fineness, and luster those obtained from flax. It is useful as a substitute for silk, and as a material for mixing with wool or cotton—useful, too, for cordage, sewing silk, or twist, laces, etc. In China it is used in fabrics for clothing for agriculturists; it is in request in India as material for stringing necklaces, and is the substance of the well-known pine cloth of the Philippine Islands. It is remarkably durable, unaffected by immersion in water, is yellowish white, soft, silky, flexible, and long in staple. Samples cleaned, without washing, when twisted to the size of binding twine, have shown a breakage strain of 150 pounds.

Pinero

Pine Bullfinch, or **Pine Grosbeak**, *Pyrrhula* or *Pinicola enucleator*, a well-known bird with head, neck, fore part of breast, and rump bright red; back grayish-brown or black, edged with red; lower parts light gray; two white bands on the dusky wings; larger than the bullfinch. Common in the Arctic regions, whence it migrates S. in numbers in the United States, more sparingly in Europe; called also pinefinch and pine grosbreak.

Pine Chafer, or **Pine Beetle** (*Hylophagus piniperda*), a species of beetle which infests Scotch pines. It feeds on the young shoots of these trees and eats its way into the heart, thus converting the shoot into a tube.

Pinel, Philippe, a French physician; born in St. Andre, France, April 25, 1745. He was admitted a member of the institute in 1803. His most valuable works were his "Medico-philosophic Treatise on Mental Alienation" (1791), and "Philosophic Nosography" (1798), with its commentary "Clinical Practice" (1802). Pinel gained for himself undying fame by his reformation of the old barbarous methods of treating the insane. The physicians brought up under the old system were not ashamed to offer a vigorous opposition to his philanthropic opinions; but he fortunately succeeded in thoroughly establishing their correctness, and his system in a few years prevailed over the whole of Europe. He died in Paris, Oct. 26, 1826.

Pine Marten, an animal, *Mustela martes*, distributed over Europe and Asia. The body is long and lithe, about 18 inches, with a tail two-thirds that length; legs short, paws with five digits armed with claws; snout sharp, vibrissæ long; fur dark brown, lighter on cheeks and snout; throat, and under side of neck light-yellow. It is arboreal, and frequents coniferous woods, whence its popular name. The female makes a nest of moss and leaves, sometimes occupying those of squirrels or woodpeckers and killing the rightful owners.

Pine Needle Wool, pine wood wool, a fibrous substance, prepared in Prussia and some of the Southern States by treating the needles of coniferous trees with a strong solution of sodic carbonate. It is used for stuffing mattresses, and for other upholstery purposes.

Pinero, Arthur Wing, an English dramatist; born in London, May 24, 1855. A lawyer's son, he studied for the law, then became an actor, and ultimately left the stage for dramatic authorship. His first comedy, "Two Can Play at That Game," was produced in 1877, and was followed by "Two Hundred a Year" (1877); "The Money Spinner" (1880); "The Magistrate" (1885); "Dandy Dick" (1887);

"Sweet Lavender" (1888); "The Profligate" (1889); "Lady Bountiful" (1891); "The Second Mrs. Tanqueray" (1893), conceded to be his most powerful work; "The Notorious Mrs. Ebbsmith" (1895); "The Benefit of the Doubt" (1896); "The Princess and the Butterfly" (1897); "The Lawney of the Wells," and "The Gay Lord Quex" (1899). Knighted in 1909.

Pinerolo, or **Pignerol**, a town of North Italy, at the E. foot of the Alps, 23 miles S. W. of Turin. From 1042 a town of Savoy, it was till 1713 strongly fortified, having among other defenses a citadel, in which the Man with the Iron Mask, Lauzun, and Fouquet were imprisoned. This fortress was in French hands from 1536 to 1574, again from 1630 to 1696, from 1704 to 1706, and from 1801 to 1814. The town contains a cathedral and a technical school. Cloth, paper, leather, cotton, and silk are manufactured. Pop. 12,281.

Pine-tree Money, money issued in Boston, Mass., in the 17th century (after 1652), and so called from bearing the rude figure or print of a pine tree on one side.

Pine-tree State, a popular name of Maine, a large part of its surface being covered by pine forests.

Piney Resin, the resin of *Vateria indica*, obtained by incisions in the trees. It is used for varnish, for candles, etc.

Piney Tallow, malabar tallow, obtained by boiling the fruit of *Vateria indica*. Piney tallow has a waxy appearance, a faint agreeable odor, sp. gr., 0.9625, melts at 37.5°, and is soluble in alcohol.

Piney Varnish, a varnish prepared from piney resin.

Ping-Pong, table lawn tennis, a game that was introduced from England and became very popular in the United States in 1902. The game is played very much as is the regular game of tennis. Across the center of a table a net about six inches high is stretched; the rackets and balls are proportionately small, the former being strung with fine gut, or formed from a single piece of vellum stretched tightly over a racket frame; and the latter being made of celluloid. There are no side or court lines as in tennis, and but two people may play at a time. The principal exceptions to tennis rules are: the server has but one trial to "place" his serve; the ball must strike the table and rebound before it can be played, hence there is no "volleying"; no overhand strokes are permitted, and the player may not move from the end of the table. The scoring is the same as in tennis. See TENNIS, LAWN.

Pingree, Hazen S., an American manufacturer; born in Denmark, Me., Aug. 30, 1842. He enlisted in the United States army in 1862; served throughout the war

and was in all the principal battles. At the close of the war he settled in Detroit, Mich., and engaged in the shoe business, subsequently becoming the head of the largest factory of its kind in the West. He was elected mayor of Detroit in 1889, on the Reform ticket. His radical ideas on the reform of monopolies, etc., caused much agitation, especially in connection with street car companies. He also instituted the "potato patch," a scheme for employing applicants for charity in productive labor, a plan which has been adopted by other cities. In 1896 he was elected governor of Michigan, holding the office of mayor also, till March 19, 1897, when according to a decision of the Supreme Court he relinquished the latter office. He was reelected governor in 1898. He died June 18, 1901.

Pinguicula, a genus of plants of the natural order *Lentibulariaceæ*, with rosettes of fleshy radical leaves, and solitary purple, violet, or yellow flowers.

Pinion, in machinery, the lesser of two cogwheels in gear. It may be spur, bevel, miter, etc. The pinions of watches are made from pinion wire, turned down at the parts which are not destined to mesh with the coacting wheel.

Pink, in art, a class of pigments of yellow or greenish-yellow color, prepared by precipitating vegetable juices on a white earth, such as chalk, alumina, etc., and used only in water colors. The varieties are Italian pink, brown pink, rose pink, and Dutch pink.

In botany, the genus *Dianthus*, of about 70 known species. The majority are cultivated in gardens; specifically, *Dianthus plumarius*, the garden pink; stem procumbent, rooting, much-branched; leaves linear and subulate, rough at the margins; peduncles three on a stem, with solitary flowers; calyx scales shortly mucronate; the petals digitate, single or double, multifid to the middle, white, pink, spotted, or variegated, and sweet-scented. It is common favorite in gardens. Also various plants superficially resembling it in flowers; thus, the cushion pink is *Silene acaulis*, the moss pink, *Phlox subulata*.

Pink-eye, a highly contagious disease in horses.

Pinkerton, Allan, an American detective; born in Glasgow, Scotland, Aug. 25, 1819. In 1840 he went to Canada and thence to Chicago, where in 1850 he joined the detective department. Subsequently he organized the detective agency which still bears his name. He wrote many interesting stories of his experiences, which were afterward collected in one volume entitled "Thirty Years a Detective," and published in 1884. He died July 1, 1884.

Pinkerton

Pinkerton, William Allen, an American detective; born in Dundee, Ill., April 7, 1846; son of Allan Pinkerton, the founder of the Pinkerton National Detective Agency. He served through the Civil War in the United States Secret Service, and after the close of the war entered his father's office. On the death of his father he became head of the agency and extended the business so as to operate throughout the world.

Pinkie, a battle fought on Sept. 10, 1547, near Musselburgh in Midlothian, Scotland, between 14,000 English under the Protector Somerset and twice that number of Scotch. The latter were utterly defeated, more than 10,000, it is said, being killed on the field and in the pursuit, while the English loss was barely 200.

Pinkney, William, an American diplomatist; born in Annapolis, Md., March 17, 1764; was admitted to the bar in 1786; was a member of the Legislature of his State that ratified the Constitution of the United States. In 1796 Washington appointed him a commissioner to determine the claims of American merchants to compensation for losses and damages caused by the English government. In 1806 he was sent with James Monroe to treat with the English government regarding the latter's repeated violations of the rights of neutrals and was resident minister in London in 1807-1811, when President Madison appointed him attorney-general of the United States. In 1816 he was appointed minister to Russia and special envoy to Naples. After his return in 1818 he resumed law practice. In 1820 he was elected to the United States Senate. He died in Washington, D. C., Dec. 25, 1822.

Pinkroot, *Spigelia marilandica*, a medicinal herb found in the United States.

Pinna, a genus of *Aviculidæ*; shell sometimes two feet long, equivalve; umbones anterior, posterior side truncated and gaping; hinge, edentulous; animal with a doubly fringed mantle and an elongated grooved foot; shell attached by a strong byssus spun by the animal. This byssus is sometimes mixed with silk and woven into gloves; known species, recent, 30 from the United States, Great Britain, the Mediterranean, Australia, etc.; fossil, 60, from the Devonian onward; typical species, *Pinna nobilis*.

Pinnace, a man-of-war's boat, next in size to the launch; it is carvel built, usually from 28 to 32 feet long, has a beam .29 to .25 of its length, and is rowed by six or eight oars. Also, a small schooner-rigged vessel provided with oars or sweeps; vessels of this kind of 60 to 80 tons burden were formerly employed by the French for

Pinocle

coast defense, and carried one long 24-pounder and 100 men.

Pinnacle, an ornament placed on the top of a buttress as a termination to an angle or gable of a house, church, or tower; any lesser structure of any form rising above the roof of a building, or capping and terminating the higher parts of other buildings or of buttresses. Pinnacles are frequently decorated, and have the shafts formed into niches, paneled or plain. The tops are generally crocketed, with finials on the apex; each of the sides almost invariably terminates in a pediment. In plan they are usually square, but are sometimes octagonal, and, less commonly, hexagonal or pentagonal.

Pinnate, a botanical term meaning divided into several or many smaller leaves or leaflets; having simple leaflets arranged on both sides of a common petiole. Other modifications are, alternately pinnate, interruptedly pinnate, decursively pinnate, digitato-pinnate, and twin digitato-pinnate. In zoölogy, a term meaning shaped like a feather; having lateral processes. Also, provided with fins.

Pinnated Grouse, *Tetrao cupido* (Linn.). elevated to generic rank as *Cupidonia cupido*; known also as the prairie hen, or prairie chicken. The male is remarkable as possessing two erectile tufts in the nape, and an air bladder (connected with the windpipe, and capable of inflation) on each side of the neck, in color and shape resembling small oranges; general plumage brown, mottled with a darker shade; habitat, prairies of the Mississippi valley, from Louisiana N.

Pinnigrada, or **Pinnipedia**, a section of the carnivorous order of mammals, in which the fore and hind limbs are short, and are expanded into broad webbed swimming paddles. The section comprises the seals and walruses.

Pinocle, **Pinochle**, or **Penuchle**, a game of cards very popular in the United States, particularly among German-Americans. The object of the game, which may be joined in by either two, three, or four persons, is to secure 1,000 points. The game is played with two full packs of cards, mixed, from which the twos, threes, fours, fives, sixes, sevens, and eights have been taken. This is the schedule of "points" or "melds":

Eight aces count.....	1,000
Eight kings count.....	800
Eight queens count.....	600
Eight jacks count.....	400
Two queens of spades and two jacks of diamonds (double pinochle) count.....	300
Ace, ten, king, queen, and jack of trumps count	150
Four aces of different suits count.....	100
Four kings of different suits count.....	80
Four queens of different suits count.....	60
Four jacks of different suits count.....	40

Pinsk

Queen of spades and jack of diamonds (pinochle) count.....	40
King and queen of trumps (royal marriage) count	40
King and queen of a suit not trumps (marriage) count	20
Nine spot of trumps counts.....	10

The relative value of the cards is: Ace counts for 11 points, 10 spot counts for 10 points, king for four, queen for three, jack for two, and the nine counts nothing. The last trick counts 10 points for the player who takes it. The total points, therefore, of the cards and last trick combined amount to 250. Four-handed pinochle is usually played two against two as partners, sitting opposite one another. The cards are all dealt out, four at a time, each player receiving 12, and the last card is turned up for trump. If a nine is turned up the dealer is credited at once with 10 points; if any other card is turned up either of the other players who holds a nine of trumps may exchange it for the trump card and claim 10 points, the player sitting on the left-hand side of the dealer having the preference. Each player then melds whatever he has in his hand and the partners score together. The eldest hand then leads a card for the first trick. In every trick each player must follow suit; if he cannot he must trump; if neither is possible, he may play any card he pleases; he must take the trick if he can; the player who takes the trick leads for the next. When either side reaches 1,000 points the scorer calls "game," and the balance of the hands are void.

Pinsk, a town of West Russia, standing in the midst of what were formerly vast marshes (in large part drained since 1875), on a branch of the Pripet, 98 miles E. of Brest-Litovsk; it manufactures leather, and has a large transit trade. Pop. (1897) 27,938, two-thirds being Jews.

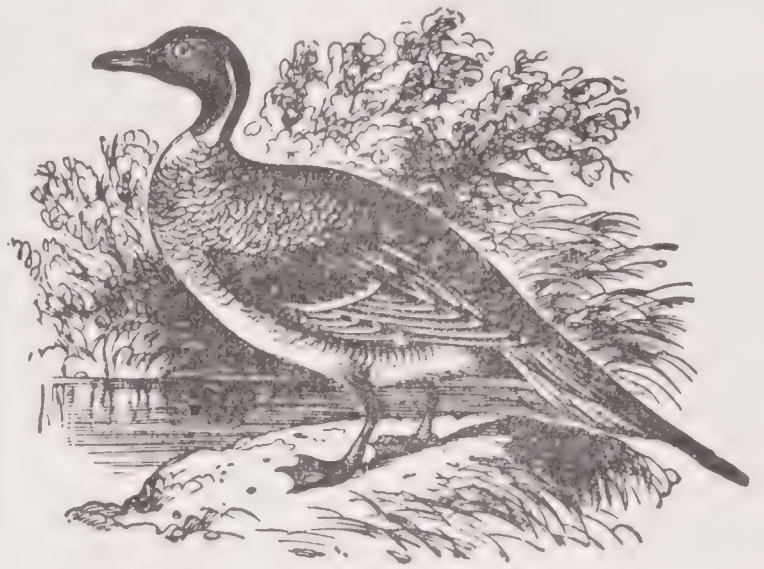
Pinsuti, Ciro, an Italian musical composer; born in Sinalunga, near Siena, Italy, May 9, 1829. He studied music at Bologna (1845), and was a special pupil of Rossini. From 1848 to 1885 he lived in England as teacher of singing, chiefly at London and Newcastle. From 1856 he taught singing at the Royal Academy of Music. As a composer he wrote charming music for songs (more than 300 in all). In celebration of the union of Tuscany with Italy in 1859 he composed a Te Deum, but was not successful as a writer of larger musical compositions. He died in Florence, March 10, 1888.

Pint, a measure of capacity used both for dry and liquid measures. It contains 34.65925 cubic inches, or the eighth part of a gallon. In medicine it is equivalent to 12 ounces.

Pintail Duck, a species of *Querquedula*; *Q. acuta*, or *Dafila caudacuta*, having the

Piombi

upper parts and flanks ash, with narrow stripes of black; under parts white; head



PINTAIL DUCK.

umber-brown; tail pointed. It inhabits the N. of Europe and America.

Pinto, Ferao Mendez. See MENDEZ, PINTO FERDINAND.

Pinturicchio (pĭn-tû-rik'yō) ("the little painter"), an Italian painter of the Umbrian school, whose real name was Bernardino di Betto; born in Perugia, Italy, in 1454. He lived for a time at Rome, and while there was engaged on the frescoes of the Sistine Chapel, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II. (Æneas Silvius), in the cathedral library at Siena. There are also fine frescoes by him in the Buffalini Chapel of the Church St. Maria in Araceli, Rome. He left many exquisite altar pieces and other works in tempera; he never painted in oil. He died in Siena, Italy, Sept. 11, 1513.

Pinzon, Alonzo, Vincent, Yañze, and Martin (brothers), Spanish navigators, who had commands in Columbus' first voyage, and by whose exertions mainly it was that a sufficient number of men were induced to risk their lives on this perilous enterprise. Vincent Yañez was the more distinguished of the brothers; he made several voyages, on the most important of which he sailed in December, 1499, and discovered Brazil and the river Amazon, three months before Cabral took possession of South America for the crown of Portugal.

Piombi, the notorious roof cells (*sotto piombi*, "under the leads") of the state prisons of Venice, in which Casanova and many other notable prisoners were confined. The heat in summer and the cold in winter are said to have been intense; though of late it has been asserted that they must have been comparatively pleasant abodes.

Piombino

Piombino, a former principality of Italy, lying along the coast opposite the island of Elba, the greater part of which belonged to it. Its extent was 139 square miles; and its population, previous to its incorporation with Italy in 1860, about 25,000. Piombino, originally a fief of the empire, came in the 14th century into the possession of the Appiani, who, after ruling it for nearly 200 years, made way for the Buoncompagni, who were expelled by Napoleon in 1801; but after the Congress of Vienna the principality was put under the suzerainty of Tuscany. The town of Piombino, on a promontory 50 miles S. of Leghorn, has iron rolling mills.

Piombo, Sebastiano, del, an Italian painter; probably born in Venice. He was a disciple of Giorgione, and painted historical and portrait pieces. One of his finest works, "The Raising of Lazarus," is in the National Gallery in London. Later in life, he quitted his profession to assume the functions of keeper of the signet to Pope Clement VII.; whence arose his name Del Piombo, "of the lead," in allusion to the lead of the seal. Many of the designs of his pictures were furnished by Michael Angelo; Sebastiano supplying the fine coloring, which characterized his style. He died in Rome, June 21, 1547.

Pioneer, one of a body of soldiers equipped with pickax, spade, etc., in the proportion of 10 to every battalion of infantry, whose duty it is to clear and repair roads, bridges, etc., as far as possible, for troops on the march. They are placed at the head of the battalion of which they form a part, and are commanded by a pioneer sergeant. Also, one who goes before to prepare or clear the way, or remove obstructions for another, especially in the settlement of a new region.

Piotrkow, a town of Russian Poland, 87 miles S. W. of Warsaw. Cotton and wool spinning is largely prosecuted. It is one of the oldest Polish towns; here in the 15th and 16th centuries diets were held and the kings elected. Pop. (1897) 30,824.

Piozzi, Hester Lynch Salisbury (Thrale) (pē-ots'ē), an English author; born in Bodvel, England, Jan. 27, 1741. She received a good education, and married in 1763 Henry Thrale, a brewer much her elder, taciturn and wholly absorbed in business, and who allowed her little liberty. She first became acquainted with Dr. Johnson the next year; he spent much time at their home and traveling with them. After Thrale's death she married Mr. Piozzi, a cultivated Italian musician of considerable note; Johnson resented the change and left her with reproaches. Though she wrote other things, her "Anecdotes of Dr. Johnson" and her "Autobiography" are the

Pipe Fish

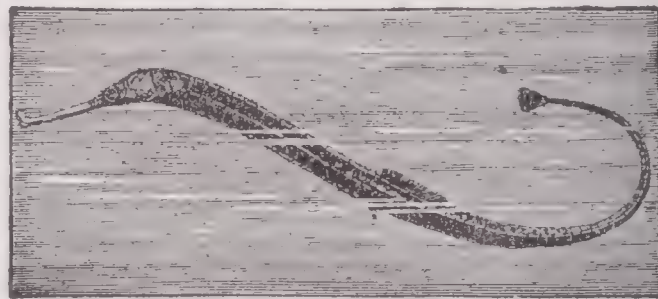
works now read. She died in Clifton, May 2, 1821.

Pip, a disease in fowls, consisting in a secretion of thick mucus from the tongue and lining membranes of the mouth, by which the nostrils are stuffed and clogged.

Pipa, a genus of Batrachian reptiles, closely allied to the common toad, but distinguished by the body being horizontally flattened, the head large and triangular, tongue wanting, tympanum concealed beneath the skin, the eyes small, placed near the margin of the upper jaw. The best-known species is the Surinam toad, *P. Surinamensis*, which is considerably larger than the common toad. The pipa lays its eggs in the water, after which they are collected by the male, and placed on the back of the female, the skin enlarging in such a manner as to enclose the eggs in cells; here the development goes on till the young come forth as perfectly formed toads.

Pipal. See PEEPUL.

Pipe, a long hollow body or tube, made of various materials, as earthenware, iron, lead, copper, glass, etc. The name is applied especially to tubes for the conveyance of water, gas, steam, and the like. Also a wind instrument of music, consisting of a



PIPEFISH.

tube of wood or metal. As the technical name of a particular instrument the word formerly designated a flute, but is obsolete, all the tubular instruments now having specific names. The tubes of an organ are called organ pipes or pipes.

Also, a running vein in a mine, having a rock root and sole, and called a pipe vein.

Pipe, a wine-measure, usually containing two hogsheads or 105 imperial or 126 wine gallons; two pipes or 210 imperial gallons make a tun. The size of the pipe varies according to the kind of wine contained: a pipe of Madeira contains 110 wine gallons; of sherry, 130; of port, nearly 138, and Lisbon, 140.

Pipe, Clay, a variety of clay adapted by its plasticity and freedom from impurities for the manufacture of pipes.

Pipe Fish, a popular name for any individual of the family *Syngnathidæ*. *Siphonostomata typhle* is the broad-nosed pipefish; *Nerophis æquoreus*, the ocean pipe-

Pipe Line

fish; *N. lumbriciformis*, the worm, or little pipefish; and *N. ophidion*, the straight-nosed pipefish.

Pipe Line, one of the most remarkable of modern devices for lessening the cost of transportation of petroleum. Very soon after the discovery of the vast natural reservoirs of petroleum in the United States the transportation problem entered largely into consideration in connection with the marketing of the product. At first the crude oil was transported from the wells to the refineries on barges and flatboats. Later, railroads obtained much of this business. About 1870 wooden tank cars were displaced by cars with tanks constructed of boiler iron. These tank cars are still in use to a large extent. The practicability of a line of tubing was suggested by Gen. S. D. Karn, of Parkersburg, W. Va. In 1872 a Mr. Hutchinson laid down a short line of pipe on the siphon principle from the Tarr farm to the first refinery erected in the oil country at Plumer, the well being on one side of a high hill and the refinery on the other. The high air pressure caused the pipes to leak at the joints, and Mr. Hutchinson eventually abandoned the scheme. In 1875 the first successful pipe line was laid by Samuel Van Syce from Pithole to Miller's farm. The tubing was put together at the joints with a screw and thimble, and though an ascent of 600 feet had to be overcome, when the pipes were started a steady stream of oil poured into the tanks at the other end of the line, proving the device a success. Next came an effort to construct a pipe line from the wells to the seaboard, and in 1875 the Pennsylvania Transportation Company was authorized to construct a pipe line from the oil regions to tide water. By 1877 no less than 16 pipe lines traversed the oil regions, and the competition was so great that the business of transporting oil by this method was no longer profitable. At this time the United Pipe Lines Company was organized, and commenced the construction of long-distance pipe lines. Generally, to avoid the extremes of heat or cold, the pipes are buried under the surface of the ground about two feet. They are laid on a bee line, and follow the face of the country to tide water. There is one line in Allegheny, Pa., which in a distance of 4 miles ascends an elevation of about 1,300 feet. The pumping stations are located at central points in the valleys along the various lines. Each pipe line section is patrolled by a lineman, and the smallest leakages are quickly detected and righted. To remove sediment and other deposits an automatic scraper is introduced into the pipes, the oil pressure forcing the scraper along from one station to the next, the sound of its travel being thoroughly audi-

Pique

ble to the lineman who follows it in its passage.

Piperaceæ, pepperworts; the typical order of the alliance Piperales; shrubs or herbs, with jointed stems; opposite, verticillate, or alternate leaves, with or without stipules; flowers in spikes, either terminal, axillary, or opposite the leaves; stamens two or more; ovary one-celled, with a single erect ovule; fruit somewhat fleshy. They grow in the hotter parts of the world; rarest in Africa; generally aromatic; known genera 20, species 600.

Pipette, an instrument used by chemists, druggists, etc., consisting of a glass tube with a bulging expansion about the middle, into which a certain quantity of liquid may be sucked by the mouth, so as to be transferred from one vessel to another.

Pipi, the name given to the ripe pods of *Cæsalpinio Papai*, which are used in tanning.

Piping Crow, the *Gymnorhina tibicen*, a bird from New South Wales. It has great powers of mimicry; called also the flute player. Also the *Gymnorhina*, a subfamily of *Corvidæ*, with five genera.

Pipistrelle, *Vesperugo pipistrellus*, the commonest and most widely distributed of the British bats; color reddish-brown, paler beneath. The wings extend down to the base of the toes, and their membrane, like that of the ears, is of a dusky tint. This bat is specially a dweller in temperate regions, its period of hibernation is short, and the tail is used as an organ of prehension.

Pipit, or **Titlark** (*Anthus*), a genus of perching birds possessing striking affinities with the larks, which they resemble in the large size of the hinder claw, but commonly classed with the wagtails, which they closely resemble on their habits of running swiftly on the ground. The meadow pipit or titlark (*A. pratensis*) is the commonest British species. The shore pipit, or rock lark (*A. petrosus*), frequents the sea beach, and feeds on mollusks and crustacea. The tree pipit or titlark (*A. arboreus*) is a summer visitant only in the British Isles. All the pipits build their nests on the ground. The song in all consists of a clear, simple note. The *A. ludovicionus*, six to seven inches long, is common in North America.

Pippin, a name given to several varieties of apples, as a Kentish pippin, or lemon pippin, etc. Normandy pippins are apples dried in the sun and stored for winter use.

Pique, a French material, made of two cotton threads, one thicker than the other, which are woven, and united at certain points, and there made an extra thickness. The pattern is usually of a lozenge shape.

Piquet

Piquet, a game of cards played between two persons with 32 cards—viz., the four honors and the highest four plain cards of each suit. The cards are shuffled and cut as in whist, and then dealt, two by two, till each player has 12, and the remaining eight, called the “talon,” or stock, are then laid on the table. The first player must then discard from one to five of his cards, replacing them with a similar number from the talon; and after him the younger hand may discard if he pleases, similarly making up his proper number from the remaining cards of the talon. The player who first scores 100 wins the game, and the score is made up by reckoning in the following order: *carte-blanche*, the point, the sequence, the quatorze, the cards, and the capot. “*Carte-blanche*” is a hand of 12 plain cards, and counts 10 for the player who possesses it. The “point” is the greatest number of cards in any suit, or, if the players are equal in this respect, that which is highest in value (the ace counting 11, each court card 10, and the plain cards according to the number of pips), and counts a number equal to the number of cards in the suit. The “sequence” is a regular succession of three or more cards in one suit, and the highest sequence (*i. e.*, the one containing the greatest number of cards, or, if the players have sequences equal in this respect, the one of the two which begins with the highest card), if of three cards, counts three; of four cards, four; of five cards, 15; of six cards, 16, etc. The “quatorze” is a set of four equal cards (not lower than tens), as four aces, four queens, etc., and the highest quatorze counts 14 for its holder; but should neither player have a quatorze, then the highest set of three is counted instead, but it reckons only three. The possessor of the highest sequence or the highest quatorze also counts all inferior sequences and quatorzes (including sets of three); while his opponent’s sequences and quatorzes go for nothing.

The first player reckons his points and plays a card; the dealer then reckons his points, and follows his opponent’s lead, and the cards are laid and tricks are taken as in any ordinary card game. Each player counts one for every card he leads, and the taker of the trick (if second player) counts one for it; the possessor of the greater number of tricks counting 10 in addition (the “cards”), or if he takes all the tricks, he counts 40 in addition (the “capot”). If one player counts 30—*i. e.*, 29 by his various points, and one for the card he leads, before his adversary has counted anything, he at once doubles his score, reckoning 60 instead of 30 (this is called the “pique”), and should his score reach 30 before he plays a card, or his ad-

Pirai

versary begins to count, he mounts at once to 90 (the “repique”).

Piqué Work, a fine kind of inlaid work, resembling Buhl work, but much more expensive and elaborate, the inlay being minute pieces of gold, silver, and other costly materials.

Piracy, the act, practice, or crime of robbing on the high seas. This offense at common law consists in committing those acts of robbery and depredation on the high seas which, if committed upon land would have amounted to felony there. But other offenses have, by various statutes, been made piracy, and liable to the same penalty. Thus trading with, or in any way aiding, known pirates, is piracy. So, too, any commander or seaman of a ship who runs away with any ship, boat, goods, etc., or who voluntarily delivers such up to any pirate, is guilty of piracy. Any one who conveys or removes any person as a slave is also by statute law of most civilized nations guilty of piracy. The penalty formerly was death, whether the guilty party were a principal, or merely implicated as an accessory before or after the fact, but now is reduced to imprisonment. Also, literary theft; an infringement of the law of copyright.

Piræus, called also **PORT DRACO**, the harbor of both ancient and modern Athens. Planned by Themistocles and laid out by Hippodamus of Miletus, the Piræus was built in the glorious days of Pericles; this ruler and Cimon before him built the three “long walls” that connected Athens with its port (5 miles to the S. W.), and so ensured a free and safe passage from one to the other at all times. It was both a war harbor and a commercial port, many foreigners living within its walls. Its arsenal (built 347–323 B. C.) and fortifications were destroyed by Sulla in 86 B. C., and from that time the town sank into decay. The modern Piræus, which has grown up since 1834, is a regularly laid out but mean-looking town, with a naval and a military school, arsenal depots, and manufactures of cottons, flour, paper, iron, nails, carts, furniture, etc., and is growing rapidly. A railway connects it with Athens. More than half the trade of Greece is through this port. Its trade in 1890 was divided between \$12,708,500 for imports—coal and railway plant, etc., and \$10,498,000 for exports, chiefly tobacco, valonia, hides, bones, horns, cheese, wool, etc. A total of 6,000 vessels enter annually, one-half the tonnage being in Greek bottoms. Pop. (1907) 73,579.

Pirai, or **Piraya**, the *Serrasalmo Piraya*, a voracious fresh-water fish of tropical America. It is three or four feet in length, and its jaws are armed with sharp lancet-

Pirano

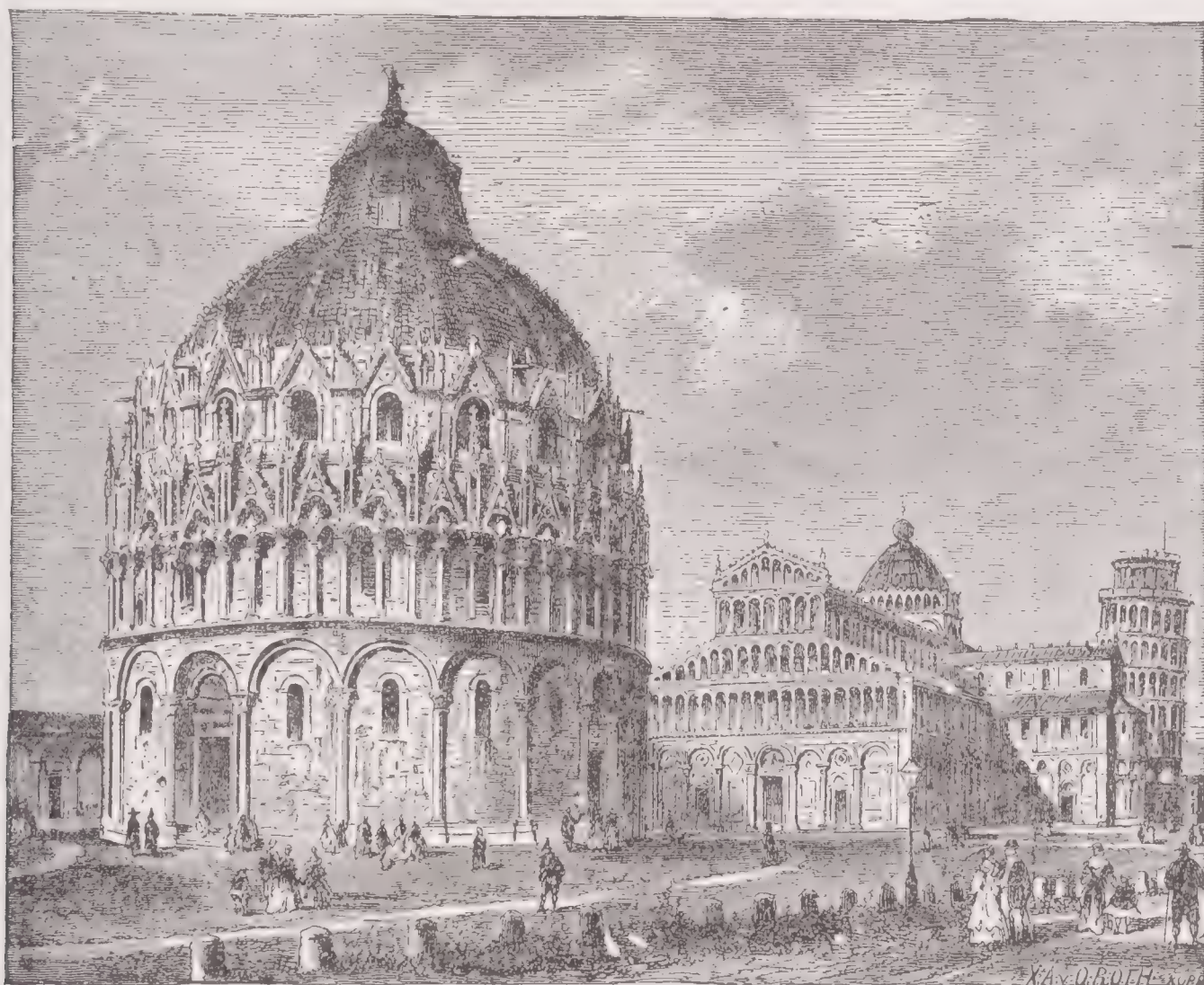
shaped teeth, from which cattle when fording rivers sometimes suffer terribly.

Pirano, a seaport of Austria, on a promontory on the S. side of the Gulf of Trieste; 12 miles S. W. of the city of Trieste. It has two harbors, an old castle, and manufactures of soap, glass, etc., with neighboring salt works.

Pirmasens, a town of the Bavarian Palatinate, and formerly the chief town of the county of Hanau-Lichtenberg, 34 miles W. of Landau; chief manufactures, shoes and

Pisa

baptistery, the cemetery, and the belfry, is perhaps, the finest specimen that exists of the style of building called by the Italians the Gotico-Moresco. The most remarkable buildings in Pisa are the CAMPO SANTO (*q. v.*), and the belfry, or campanile, a cylindrical tower, 178 feet in height, constructed of successive rows of pillars, chiefly of marble; it is extremely graceful in its proportions, but its chief peculiarity consists in its inclination about 13 feet out of the perpendicular, whence it is commonly



PISA: THE BAPTISTERY.

musical instruments. Close by, the Prussians under the Duke of Brunswick defeated the French commanded by Moreau on Sept. 14, 1793. Pop. (1896) 24,548.

Pirna, a town of Saxony; on the left bank of the Elbe, 11 miles S. E. of Dresden. It contains a fine 16th century church; a castle (1573), used as a lunatic asylum since 1811; and manufactures of glass, chemicals, tobacco, stoves, etc. Eight thousand men are employed in the sandstone quarries. Pop. (1900) 18,296.

Pisa, a city of Central Italy, capital of the province of Pisa, on the Arno, 8 miles from its mouth, 13 miles N. E. of Leghorn, and 50 miles W. of Lucca. The walls are 5 miles in circuit. The Arno flows through the city, and is crossed by several bridges, the principal one being of fine marble. The cathedral, with its attendant buildings, the

called the Leaning Tower of Pisa. Besides the cathedral, the city contains several other elegant churches. In the square of the university are several handsome buildings, chiefly built of marble, and among the public establishments the hospital is the most conspicuous. The University of Pisa is one of the oldest in Italy; it has 56 professors and about 1,000 students. Galileo, who was a native of Pisa, was formerly one of the professors. A library, botanical garden, a cabinet of natural history, and an observatory are connected with the university. The mildness of the climate in the winter renders it a great resort for invalids, and the celebrated baths in the vicinity attract visitors from a great distance. Pisa is supposed to have been founded shortly after the Trojan War. It became a Roman colony about 179 B. C.,

Pisa

but did not attain to distinction before the 10th century, when it became the leading commercial republic of Italy. During the 11th century it maintained its superiority in the Mediterranean, materially assisting the French in the Crusades. A war with



PISA: LEANING TOWER AND CATHEDRAL.

Genoa ended in the ruin of Pisa in 1284. The city afterward became the prey of various factions, till finally united to Florence in 1406. Pop. (1901) 61,321.

Pisa, Council of, a church council generally included in those called ecumenical, met and opened in Pisa March 25, 1409, and the 23d and last session of which was held Aug. 7 following. Its aim was to end the schism which had divided the Western Church for 30 years; and with this view the leading cardinals, finding that neither of the rival Popes, Gregory XII. and Benedict XIII., would keep their promises to abdicate, had set aside the claims of both, and themselves convoked a general council. It was attended from first to last by 24 cardinals, 4 patriarchs, 80 bishops, 102 proctors of bishops, 87 abbots, 200 delegates of abbots, besides many generals of orders, doctors, deputies of universities, and ambassadors. After the rival Popes failed to appear in obedience to its summons, the council formally tried the claims of both in turn, and deposed them as schismatics and heretics. The cardinals then formed themselves into conclave and elected Cardinal Philargi, who assumed the name of Alexander V. But the council, instead of getting rid of the contending Popes, had only added a third, and the faithful continued to be distracted in their allegiance for eight years longer, down to the time of the Council of Constance.

Pisaurum

Pisagua, a small port of the now Chilean province of Tarapacá, 40 miles N. of Iquique. It was bombarded and was the scene of much fighting during the Chilean civil war in 1891.

Pisano, the surname of several distinguished artists of Pisa, very important in the early history of art in Italy. GIUNTA PISANO, or GIUNTA DI GIUSTINO of Pisa, is the earliest known Tuscan painter, lived in the 13th century. Giunta was anterior to Cimabue, and to him belongs the merit of reviving painting in Italy. NICCOLA PISANO, born about 1206. He was equally distinguished as sculptor and architect, and must hold the same rank in the former art that Giunta does in painting. He distinguished himself as early as 1225 at Bologna, where he executed the tomb of San Domenico. Niccola was also a great architect; he executed the church of the Frari at Venice; he was the pioneer of the Renaissance in Italy, in sculpture and in architecture. He died in 1278. GIOVANNI PISANO, the son and assistant of Niccola, and likewise one of the greatest of the early sculptors and architects of Italy; born in Pisa in 1240, died in Pisa in 1320, and was placed in the same tomb with his father in the CAMPO SANTO (*q. v.*), which he had designed. ANDREA PISANO was another early artist of Pisa, but nearly a century later than Giunta; he was a sculptor and architect, and the friend of Giotto. Andrea was born about 1270. Of several works still extant by Andrea, the bronze gates of the Baptistry of St. John at Florence are the most important. These two gates are still perfect; the exact date of their execution is



PAINTING BY NICCOLA PISANO.

disputed, whether they were finished in 1330, or only commenced in that year. The city gates and towers were also of his designing, as well as several important buildings. He died in Florence, in 1349.

Piscataqua, a river which constitutes part of the boundary between Maine and New Hampshire, and forms at its mouth the excellent harbor of Portsmouth.

Pisaurum. See PESARO.

Pisces, in astronomy, the 12th and last of the zodiacal constellations. It is a large constellation, bounded on the E. by Aries and Triangulum, on the W. by Aquarius and Pegasus, on the N. by Andromeda, and on the S. by Cetus. The two fishes are represented on celestial globes and maps as separated some distance from each other, and as having their tails connected by a string. One is under the right arm of Andromeda, the other under the wing of Pegasus. About 40 stars are visible to the naked eye. Bode marks the position of 257; the largest, Alpha Piscium, is of magnitude $3\frac{1}{2}$, and is a double star, one constituent being pale green and the other blue. Also the portion of the ecliptic from which precession has made the constellation move away. The sun enters it, crossing the equator, at the vernal equinox.

Pisciculture. See FISH CULTURE.

Piscina, in Roman antiquities, a large water basin in an open public place, in which the youths of Rome learned to swim. In ecclesiastical architecture, the stone basin used in the Catholic Church service to receive the water after it has been used by the priest in washing the chalice subsequent to the celebration of mass. The piscina is supplied with a drain-pipe to carry the water out of the church, and is usually constructed in the wall, close beside the high altar, near the sedilia. It takes the form of a canopied niche, and is generally richly decorated with foliage and emblematic carving.

Pise, a mode of forming walls of rammed clay. The conformation of the walls is given by means of boards on each side, and after one layer is formed and partially hardened, the boards are lifted to form bounds for another layer.

Pisemskij, Alsksei Teofilaktovich (pēzem'skē), a Russian novelist; born in Ramene, Kostroma, Russia, March 20, 1820. His greatest novel is "A Thousand Souls" (1858); he wrote also "The Stormy Sea" (1863), "The Men of 1840" (1868), "In the Whirlpool" (1871). Among his short stories are "The Wood Demon" and "Pietershik." He died in January, 1881.

Pisgah, a name that seems to have applied generally to the mountain range or district to the E. of the Lower Jordan, identical with, or itself a part of, the mountains of Abarrim (Deut. xxxii: 49; xxxiv: 1), one of the summits of which is Mount Nebo (the modern Neba), 2,644 feet above the level of the Mediterranean. From this point Moses enjoyed his glimpse of the Promised Land, in early spring. It is not the highest point among the spurs which here run out from the Moabite plateau; it is the nearest ridge to the Israelite camp in the plain of Shittim. The view on the

W. includes all the Judæan watershed, and in clear weather all Samaria and Lower Galilee, as far as Tabor and the chain of Gilboa may be seen. The Sea of Galilee and Hermon are shut out by the lofty range of Penuel (Jebel Osh'a) in Gilead, while the W. watershed of Judæa and Samaria makes it impossible to see the waters of the Mediterranean; but below to the S. W. the N. half of the Dead Sea is seen, bordered by the precipices of Engedi, beyond which stretches the dreary Jeshimon or desert of Judah.

Pishin, a district of Southern Afghanistan, just N. of Quetta, which has been governed by a political agent of the governor-general of India since 1878. The British occupied it on account of its great strategical importance; it is the meeting-place of several roads, practicable for troops but not for wheeled carriages, leading from Sind and Punjab to Kandahar. The district—area, 3,600 square miles; elevation, 5,000 feet—consists of alluvial valleys separated by ranges of hills, the whole sloping S. W. and surrounded by mountain chains that reach N. and S. 11,000 feet. The people, partly settled, partly nomad, grow wheat, barley, maize, millet, lucerne, watermelons, and muskmelons, and trade in horses to India. A branch of the Indus valley line traverses the principal valley.

Pisistratus, a citizen of Athens who raised himself to the sovereign authority in the time of Solon (to whom he was related) 560 B. C. Compelled to retire from the city by the conspiracy of Megacles and Lycurgus, he returned soon after by effecting a compromise, but was obliged to retire again, and suffer an exile of 11 years, which he spent in making preparations to recover his authority. In the 11th year he reappeared at the head of an army and regained his power, which he retained till his death, 527 B. C. He was a beneficent ruler, and did much to promote the rise of Greek literature. We owe to him the poems of Homer in their present form, Pisistratus having collected them, as they were scattered in detached parts throughout Greece, and given them orderly arrangement.

Piso, an eminent Roman family, which produced some great men, as: PISO, LUCIUS CALPURNIUS, surnamed Frugalis, on account of his frugality, consul 149 B. C., who terminated the war in Sicily. He composed annals and orations, which are lost. PISO, CAIUS, consul 67 B. C., author of a law to restrain the factions which usually attend the election of the chief magistrates. PISO, CNEIUS, consul under Augustus, and governor of Syria under Tiberius, in which situation he behaved with great cruelty. He was charged with poisoning Germanicus; on which account he destroyed

Pisolite

himself, A. D. 20. PISO, LUCIUS, a senator, who attended the Emperor Valerian into Persia in 258. On the death of that emperor he assumed the imperial title; but was defeated by Valens, who put him to death in 261.

Pisolite. See PEA STONE.

Pisquow, or Pishquitpah, a tribe of North American Indians living formerly on the Wenatchee or Pisquow river, Washington. The name has also been used collectively and applied to the Methow and other tribes in Okanogan county of that State. They are now on the Yakima reservation, Washington.

Pistacia, a genus of *Anacardiaceæ*; small trees, with pinnate leaves and small axillary panicles or racemes of small apetalous and diœcious flowers; found chiefly in Asia and the S. of Europe. *P. vera* is a small tree growing in Western Asia and Afghanistan. It produces the pistachio nut. *P. atlantica*, *P. khinjak*, *P. cabulica*, and *P. lentiscus* yield mastic; *P. terebinthus* yields a balsamic resin called thios or Cyprus turpentine. *P. integerrima*, a large deciduous tree from the Northwestern Himalayas, the Suleiman Mountains, etc., has a heart wood, according to Brandis, the best and handsomest for carving furniture and ornamental work. The galls of *P. integerrima* and those of *P. vera* are used for dyeing; the oil of the latter is demulcent and restorative.

Pistacio Nut, the fruit of the *pistacia vera*. The kernel is very oily, of a peculiar flavor and bright green in color, and is much used in confections, etc.

Pistil, the female organ in plants, standing in the middle of the stamens, around which again stand the floral envelopes. It is divided into the ovary or germen, with its ovule or ovules, the style, and the stigma, and is known as the gynœceum. A pistil may be simple or compound; the former consists of one carpel, the latter of more than one.

Pistillidium, a name given to certain small, sessile, ovate bodies in the fructification of mosses, enveloped in a membrane tapering upward into a point. When abortive they are called paraphyses.

Pistoia, or Pistoja (ancient Pistoria), a town of Italy; 20 miles N. W. of Florence, on a spur of the Apennines. Its streets are thoroughly Tuscan, and it is surrounded with walls, pierced by five gates, and has a citadel. The chief buildings are the cathedral of San Jacopo (12th and 13th centuries), containing a magnificent altar of silver (1286-1407) and several good pictures; the church of St. Bartholomew, with a fine white marble pulpit by Guido of Como (1250); St. Andrea, with Giovanni Pisano's pulpit (1301); St. John, with a

Pita Flax

font by Giovanni Pisano and terra cottas by Andrea della Robbia; the 14th century communal palace; and other palaces. The principal manufactures are iron and steel wares, and firearms—the word “pistol” in all probability takes its name through pistolese, “a dagger,” from Pistoia (Pistola). Here Catiline was defeated in 62 B. C. The town was conquered by Florence and Lucca in 1306.

Pistol. See FIREARM.

Pistole, a gold coin once current in Spain, France, and the neighboring countries; average value about \$3.85.

Piston, in machinery, a device so fitted as to occupy the sectional area of a tube and be capable of reciprocation by pressure on either of its sides. It may be of any shape corresponding accurately to the bore of the tube; but the cylindrical form is almost exclusively employed for both, as in the common pump and the steam engine. One of its sides is fitted to a rod, to which it either imparts reciprocatory motion, as in the steam engine, or by which it is itself reciprocated, as in the pump. In the former case, it has no opening leading from one side to the other, and is termed solid, though generally not really so; but in the latter, an aperture controlled by a valve permits the passage of the fluid from one side to the other during its downward movement; except in force pumps. A distinction is made in pumps; the solid piston being known as a plunger, the hollow piston as a bucket. The piston usually requires packing to cause it to fit closely within its cylinder and at the same time allow its free backward and forward movement.

Pistoria. See PISTOIA.

Pit, a hole in the ground, more or less deep, and either natural or made by digging; as: (1) The shaft of a mine. (2) A vat for tanning. (3) A cavity in which charcoal is piled for burning. (4) An excavation in the soil for protecting plants, generally covered with a frame. (5) A deep hidden hole in the ground for catching wild beasts. Also, the middle part of a theater or the floor of the house, somewhat below the level of the stage. It was formerly immediately behind the orchestra, between which and the pit the stalls are now placed. Also, an inclosed space or area in which cocks or dogs are set to fight, or where dogs are trained to kill rats. Pumping pit is a shaft in which the pumps and hydraulic machinery work. Working pit is a shaft in which the mineral is hoisted and the supplies and workmen lowered. Engine pit is the shaft in which the engine works. The bottomless pit, hell. (Rev. xx: 1.)

Pita Flax, flax made from the fiber of the *Agave Americana* (called also maguey),

and used for twine, rope, hammock meshes, etc. In Mexico it is also used for oakum. Labillardière found that its strength is to that of common flax as 7 to 11¾.

Pitaka, a division of the Buddhists' sacred literature; the *tripit'aka* meaning the three great divisions of their canonical works, the *Vinaya* (discipline), *Abhidharma* (metaphysics), and *Sutra* (aphorisms in prose), and collectively, therefore, the whole Buddhistic code.

Pitaval, François Gayot de, a French lawyer; compiler of the famous collection of "Celebrated Cases"; born in 1673, served in the army, but became an advocate, and was known as an industrious and painstaking compiler. Of his great work there have been numerous abridgments, continuations, and translations; and his name has become so identified with the collecting of criminal cases that a similar work, published by various editors in Leipsic in 1843 and succeeding years, was called "A New Pitaval." He died in 1743.

Pitcairn, Robert, a Scotch author; editor of the invaluable collection of "Criminal Trials in Scotland from 1484 to 1624" (1830-1833), held a post in the Register House at Edinburgh. He was an active member of the Bannatyne Club, and secretary of the Calvin Translation Society (founded 1843). He died in 1855.

Pitcairne, Archibald, a Scotch physician and satirist; born in Edinburgh, Dec. 25, 1652. He studied first theology and then law at the university of his native city; but having gone to France in ill health, made final choice of medicine as his life study, completing a distinguished course at Paris. He practised with success in Edinburgh till 1692, when the fame of his treatise on Harvey's discovery of the circulation of the blood secured him a call to Leyden as professor. Here he remained only a year; his lectures being ultimately published as "Medical Elements of Physics and Mathematics" (1718). He returned to Edinburgh to become one of the most famous physicians of his time; producing also "Dissertations on Medicine" (1701). But he was even more notorious as a Jacobite, an Episcopalian, a satirist of Presbyterian men and things, and, according to his opponents, as an atheist and scoffer at religion. "The Assembly" is a comedy in ridicule of the General Assembly of the kirk; and "Babell, or the Assembly" (1692), is a poem with the same aim. His Latin verses, some of which were republished by Ruddiman in 1727, are creditable. He died Oct. 20, 1713.

Pitcairn Island, a solitary island in the Pacific Ocean, between Australia and South America, in lat. 25° 3' S. and lon. 130° 8' W., measures 2½ miles by 1 mile.

It was discovered by Carteret in 1767, and was at that time uninhabited, though there were unmistakable evidences that it had been inhabited at one time. In 1790 it was taken possession of by nine of the mutineers of H. M. S. "Bounty," with six Tahitian men and 12 women, the ringleader being called Christian. Four years later the native men one night murdered all the Englishmen, except Alexander Smith, who afterward assumed the name of John Adams. Thereupon the women, in revenge, murdered all the Tahitian men. According to another account, the white men and the Tahitians murdered each other at intervals, till only two Englishmen were left alive. Certain it is that at the end of 10 years John Adams was left alone, with eight or nine women and several children; and from them the present inhabitants (126 in 1890) are descended. Adams, changed by these tragic adventures, and sobered by his responsibilities, set about the education of his companions in Christian principles. The little colony was unknown to the world till 1808, when it was "discovered" by Captain Folger of the American sealing ship "Topaz"; the first British vessel to visit it did not arrive till 1814. The islanders were visited again in 1825 and 1830, and in 1831, as their numbers had rapidly increased (to 87), they were at their own request removed to Tahiti by the British government. But, disgusted by the immorality and other undesirable customs of their Tahitian relatives, the most of them went back to Pitcairn Island, after about nine months, in a vessel chartered by themselves. The island was annexed to Great Britain in 1839. Nearly 200 of the islanders were transferred to Norfolk Island in 1856, but a number of them afterward returned. Pitcairn Island enjoys a lovely climate; its mountainous surface reaches 1,008 feet in Outlook Ridge; the soil is fertile, and produces yams, cocoanuts, bread fruit, sweet potatoes, bananas, etc. The people bear a high character for virtue, contentedness, and uprightness, and choose their own pastor and magistrate.

Pitch, a term applied to a variety of resinous substances of a dark color and brilliant luster, obtained from the various kinds of tar produced in the destructive distillation of wood, coal, etc. Pitch is extensively used in shipbuilding, etc., for closing up seams, also for keeping wood from speedy decay, or iron railings from rusting when exposed to the weather. In architecture, the rise or versed sine of an arch. In carpentry, the inclination of a roof. The common pitch has a rafter three-quarters the length of the span; the Gothic has a full pitch, the rafters being the length of the span; the Greek has a pitch $\frac{1}{2}$ to $\frac{1}{3}$ of the span; the Roman has a pitch from $\frac{1}{2}$

Pitch Blende

to $\frac{2}{3}$ of the span; and the Elizabethan has rafters longer than the span.

In hydraulic engineering, in overshot water wheels the bucket-pitch is a circular line passing through the elbows of the buckets. The elbow is the junction of the floor and the arm, which together form the bucket. In machinery: (1) The distance between the threads of a screw measured on a line parallel to the axis. (2) The distance between the centers of two adjacent teeth in a cogwheel, measured on the pitch circle. (3) The pitch of a rivet is the distance apart from center to center. (4) The distance between the stays of marine and other steam boilers. In marine boilers it is usually from 12 to 18 inches. In mining, a lode or portion of a lode let out to men to work by the piece or by a percentage of the output.

In music, musical sounds give to the mind a feeling of acuteness or gravity according to the rapidity or slowness of the vibrations producing them; hence, the former are called acute or high, the latter grave or low. The absolute pitch of sounds is measured by giving the number of vibrations per second which produce a given sound, *e. g.*, $C = 528$; the relative pitch of sounds is described by giving the ratio of vibrations of the interval, *e. g.*, a fifth is 2:3—that is, the higher sound of any interval of a fifth gives three vibrations, while the lower sound in the same time gives two. The determination of fixed pitch is purely arbitrary, and it has from time to time undergone great variations. In England we have high concert pitch $C =$ about 540, more or less, and the medium pitch $C = 528$; on the Continent the French “diapason normal,” $C = 518$, is being largely adopted. The official standard adopted in the United States during the world's fair was what is known as international or “French” pitch, which gives as a standard middle A with 435 vibrations, though the majority of American upright pianos are tuned to high concert pitch.

In planes, the slant of a plane bit in its stock. In printing, one of the guide pins, which, in floor-cloth printing, answers the purpose of the register-points. In shipbuilding: (1) The pitch of the paddles is the distance between them, measured on the circle which passes through their centers. It is commonly from 1.6 to double their depth. (2) The pitch of a propeller-screw is the length, measured along the axis, of a complete turn. A gaining-pitch is one in which the pitch gradually increases from the leading to the following edge.

Pitch Blende, a mineral chiefly found in Saxony and Cornwall, composed of 86.5 oxide of uranium, 2.5 black oxide of iron, galena, and silex. In color it varies from brown to black, and occurs globular, reniform, massive, disseminated, and pulveru-

Pithom

lent. Sp. gr. 7.5. It generally accompanies uranite.

Pitcher Plant, the *Nepenthes distillatoria*, and the best known of the genus. The specific name refers to the fact that the pitcher contains water. The leaves are oblong, terminating above in a pitcher, the flowers greenish-yellow. It is a native of Ceylon. Also any plant with a pitcher-like appendage, as *Utricularia*, *Sarracenia*, *Darlingtonia*, and *Cephalotus follicularis*. In the plural, the order *Nepenthaceæ*. California pitcher plant, *Darlingtonia californica*.

Pitch Stone, a vitreous rock of pitch-like luster and imperfect conchoidal fracture; brittle. Analyses indicate that it is probably a vitreous form of quartz felsite, or of trachyte. Sometimes porphyritic by the crystallization of feldspars or of quartz. Also spherulitic, the spherules being sometimes of large size, and presenting a fibro-radial structure, the result of a partial devitrification. Frequently incloses microliths, which in some of the pitch stones of the island of Arran are grouped in stellate and frond-like forms. Color, mostly blackish-green or dark olive-green.

Pitchurim Beans, the name given to the lobes of the drupe of *Nectandra puchury*, a South American species of laurel, used by chocolate makers as a substitute for vanilla.

Pith, the cylindrical or angular column of cellular tissue at or near the center of the stem of a plant, also called the medulla. It is not usually continued into the root, but is always directly connected with the terminal bud of the stem; and in the first instance also by means of the medullary rays with the lateral leaf buds. When examined microscopically it presents in section a union of cells resembling those of a honeycomb, of which a good example is afforded by Chinese rice paper, the pith of the *Aralia papyrifera*. The pith is at first succulent and of a greenish color, afterward it becomes dry, and in many plants its cells are broken up, leaving large cavities. In its primary state it appears to be a reservoir of nourishment for the embryo plant.

Pithecanthropus Erectus, the name given to the fossil remains of a prehistoric animal found in Java, and which represents a form intermediate between man and the higher apes.

Pithecus, a name formerly used by zoologists for various groups of apes and monkeys. See SAKI.

Pithecusa. See ISCHIA.

Pithom, one of the store cities which the children of Israel built for Pharaoh (Exod. i: 11), conclusively identified in 1883 by the excavations of M. Naville with

Pithou

the deserted Arab village Tell El-Maskhûta, on the fresh-water canal and railway line from Cairo to Ismailia, about half-way between Ismailia and Tell El-Kebîr.

Pithou, Pierre (pē-tō'), a French historian; born in Troyes, Nov. 1, 1539; among his writings are: "Memoirs of the Counts



PIERRE PITHOU.

of Champagne" (1572); "Reasons why the Bishops of France were able to give absolution to Henry of Bourbon, King of France" (1593); "Comparison of Mosaic and Roman Laws" (1673). He died in Nogent-sur-Seine, Nov. 1, 1596.

Pitman, Benn, an American phonographer; born in Trowbridge, England, July 24, 1822; brother of Sir Isaac Pitman, the inventor of phonography; was educated in his brother's academy; lectured and taught phonography throughout Great Britain for 10 years. He came to the United States in 1853, and founded the Phonographic Institute in Cincinnati; invented the electro-process of relief engraving in 1856; was military recorder of State trials during the Civil War, and lecturer on the Art and the Teaching of Artistic Wood-carving in the Cincinnati Art Academy. Chief works: "Manual of Phonography"; "History of Shorthand"; and "Phonographic Dictionary." He died Dec. 28, 1910.

Pitman, Sir Isaac, an English stenographer; born in Trowbridge, England, Jan. 4, 1813. He was master of the British School of Barton-on-Humber in 1831, established the school at Wotton-under-Edge in 1836 and removed to Bath in 1839. He was the inventor of the phonetic system of shorthand writing and published his first treatise on the subject entitled "Stenographic Soundhand" in 1837; "Phonography" (8th edition, 1840); and "Phonographic Reporter's Companion" (1853). He was the head of the Phonetic Institute at Bath, and

Pitt

was identified with the spelling reform. He was knighted in 1894, and died Jan. 22, 1897.

Pitrè, Giuseppe, an Italian folklorist; born in Palermo, Sicily, Dec. 23, 1841. On the outbreak of the revolution in 1860, he volunteered into the army of Garibaldi. At the close of the war he studied medicine at Palermo, graduating in 1866. While yet a student he had begun his literary career with "Proverbs of Sicily and Tuscany," etc. (1862), but about 1868 he began the great work of his life when he left the study of literature proper for that of popular literature and folklore generally. With incessant and enthusiastic labor he devoted himself to his chosen study, and enriched science and honored his native land with a long series of books and papers of the highest value. His "Collection of the Popular Traditions of Sicily" alone includes 19 volumes (1870-1891). Still another series, the "Curios of Popular Traditions" includes 10 volumes (1885-1891). Much of Dr. Pitrè's best work was contributed to the pages of the well known folklore quarterly, the "Magazine of Popular Traditions," edited from its foundation in 1882 by himself and S. Salomone-Marino. Besides the foregoing Dr. Pitrè published an exhaustive "Bibliography of Popular Traditions of Italy" (1891); many monographs and papers on Sicilian folk songs; proverbs; riddles; historical traditions; customs connected with birth, marriage, death, and burial; as well as special popular beliefs and superstitions, as those connected with particular festivals, Friday, the evil eye, and the like.

Pitre Chevalier, name assumed by Pierre Michel François Chevalier, a French historical writer; born in 1812. He wrote several volumes of poems; also "Studies on Brittany" (1839-1842); "Ancient Brittany" (1844); "Modern Brittany" (1844); "History of the War of the Cossacks against Poland" (1859). He died in 1863.

Pitri, the deceased ancestors of a man, but in the special sense in which the word occurs in Hindu mythology, an order of divine beings inhabiting celestial regions of their own, and receiving into their society the spirits of those mortals for whom the funeral rites have been duly performed. They include therefore collectively the manes of deceased ancestors (see LARES); but the principal members of this order are beings of a superior nature.

Pit River Indians. See PALAIHNIHAN INDIANS.

Pitt, William. See CHATHAM.

Pitt, William, an English statesman; born in Hayes, England, May 28, 1759; sec-

Pittacus

ond son of the Earl of Chatham; was educated at Cambridge University; studied law and was elected to Parliament in 1780. He was as strongly opposed to the American war as was his father. In 1783 he became prime minister; was active in the negotiations of peace with the United States, and was instrumental in the passage of many important measures. Retiring in 1801, he was recalled to office when the Peace of Amiens was broken and war with Napoleon again brought on. Through his public career he was noted as a parliamentary leader and orator. He died in Putney, England, Jan. 23, 1806.

Pittacus, one of the seven sages of Greece; born in Mitylene, in the island of Lesbos, about 650 B.C. He was a warrior as well as a philosopher, expelled the tyrant Melantheus from Lesbos; and on becoming its sovereign, 590 B.C., discharged the duties of his station in the most exemplary manner; retired after a reign of 10 years, and died 570 B.C.

Pittsburg, a city of Kansas, in Crawford co. It is situated near the S. E. corner of the State, 9 miles S. E. of Girard and 119 miles S. of Kansas City, on the Missouri Pacific, Atchison, Topeka, and Santa Fé, St. Louis and San Francisco, and Kansas City Southern railroads. Its area is a little over 4½ square miles. The various denominations are represented by some 15 churches, and there are one denominational and one private hospital. The educational institutions comprise the State Manual Training Normal School, a high school, public and parochial schools, and a public library. The city is situated in a coal region, Crawford co. leading all the other counties in the State in the production of coal, and many of its inhabitants engage in coal mining. Its manufactures include the shops of the Kansas City Southern railroad, foundry and machine shops, vitrified bricks, tiles, sewer pipe, glass, lumber and planing mill products, meat packing, artificial ice, etc. In 1900 there were 82 industrial establishments, with \$808,000 of capital and 994 wage-earners, who received \$476,000 in wages, used materials valued at \$987,000, and turned out products valued at \$1,617,000. In 1905—when only factory industries were considered, to the exclusion of neighborhood industries and hand trades—there were 35 establishments, with \$1,514,000 of capital and 964 wage-earners, who received \$557,000 in wages, used materials valued at \$886,000, and turned out products valued at \$1,825,000. In 1906 there were two National banks, with a combined capital of \$150,000, surplus and profits of \$142,000, and total resources and liabilities of \$2,165,000. The city is governed by a mayor elected for two years, and a council consisting of 8 members, 2 from each ward. It was settled and incorporated as a city of the third

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class in 1876. In 1880 it was incorporated as a city of the second class, and in 1906 as a city of the first class. Pop. (1890) 6,697; (1900) 10,112; (1906, State census) 15,964; (1910, Fed. census) 14,755.

Pittsburg, a city of Pennsylvania, the second in the State and metropolis of its western portion, a port of entry, and county-seat of Allegheny co. It is situated at the confluence of the Allegheny and Monongahela rivers, forming the Ohio river, 115 miles S. of Erie, 235 miles W. by N. of Philadelphia, 310 miles W. by S. of New York, 400 miles E. by S. of Chicago, 120 miles S. by E. of Cleveland, and 250 miles N. by E. of Cincinnati. Its greatest length from E. to W. is about 9 miles, its greatest width from N. to S. is over 6 miles, its area is 28.39 square miles, and its population was estimated in 1907 at 384,000. It is surrounded by a large number of cities and towns forming practically one great industrial community. The most important of these are given here, with their populations in 1900. N. and W. of Pittsburg is the former city of Allegheny, on the N. banks of the Allegheny and Ohio rivers, consolidated with Pittsburg in 1907. E. of Allegheny, on the N. bank of the Allegheny river, are the boroughs of Springdale (2,566), Millvale (6,736), Etna (5,384), and Sharpsburg (6,842). E. of Pittsburg is the borough of Wilkinsburg (1907 est., 17,500). S. E. of Pittsburg, on the N. bank of the Monongahela, are the boroughs of Rankin (3,775), Braddock (1907 est., 19,800), and North Braddock (6,535). In the Turtle Creek valley are the boroughs of Turtle Creek (3,262), East Pittsburg (2,883), Wilmerding (4,179), and Pitcairn (2,601). Further to the S. on the Monongahela river is the city of McKeesport (1907 est., 45,000), and, on the S. bank of the Monongahela, the boroughs of Homestead (1907 est., 15,900), Duquesne (1907 est., 12,000), and Hays (est., 3,500). S. of Pittsburg is the borough of Knoxville (3,511), and S. W. of it are the boroughs of Carnegie (7,330) and Sheraden (2,948). Opposite Allegheny are the boroughs of McKees Rocks (6,352) on the S. bank of the Ohio, and Bellevue (3,416) on the N. bank. All of these cities and towns, besides a number of smaller places, are included in Allegheny co., the population of which was 775,058 in 1900 and in 1907 approximated 1,000,000.

Topography and Streets.—The main portion of Pittsburg lies on a peninsula formed by the junction of the rivers, a much smaller portion being on the S. bank of the Monongahela and Ohio. The tongue of the peninsula is flat, but the ground rises rapidly toward the E., forming a number of hills, among which Herron hill is 535 feet above the river level. There are also narrow strips of flat land along the rivers,

with abrupt elevations to the S. and N. respectively. Mount Washington, S. of the Monongahela, is 385 feet high, and affords a magnificent view of the cities, rivers, and surrounding heights on days when the sky is not obscured by the dense smoke usually overhanging the city. At night the lurid glare of the furnaces produces a weird effect. The rivers and valleys are spanned by eight municipal and seven railroad bridges. The bridges between Pittsburg and Allegheny are owned by private corporations.

The business district occupies the level tongue of the peninsula, the factories take up the level strips along the rivers, while the residential sections are mainly on the hills—in Allegheny to the N., and in Pittsburg toward the E., beginning in the neighborhood of Herron hill. The streets of Pittsburg are laid out irregularly, and the narrow lower portion of the city suffers from congestion. The short N. and S. streets of the level strips along the rivers are entirely distinct from those of the upper city. The lower sections of Liberty and Penn avenues are devoted to wholesale and retail business, Smithfield and Wood streets and lower Fifth avenue are taken up with retail stores, and Fourth avenue is the financial center. The longest street is Penn avenue, which commences at the point of the peninsula, runs for a considerable distance parallel with the Allegheny river, then curves southward, forming an arc that reaches to the eastern limits of the city. Other important E. and W. thoroughfares are: Liberty avenue, paralleling Penn avenue for most of its length, which is about half that of the latter; Centre avenue, which curves northward, crossing Penn avenue, and is continued as Frankstown avenue to the western limits; Fifth avenue, which pursues a similar course, crossing Penn avenue near its termination; Forbes street, which is continued as Forbes avenue to the S. E. limits; and Second avenue, which parallels the bend of the Monongahela. Excepting the latter, all of these (as well as Ellsworth and Highland avenues) are, in their E. sections, among the fine residential streets. The total length of the streets of Pittsburg is nearly 600 miles, and about one-half of this is paved.

Parks and Cemeteries.—The park system of Pittsburg embraces over 1,000 acres within the city limits. It originated in 1890, when Mrs. Mary E. Schenley gave to the city over 400 acres of land in the heart of the residential district. Schenley park—named in her honor and enlarged by some additions purchased by the city—contains the great Carnegie Institute, Music Hall and Museum, the Carnegie Technical Schools, the Conservatory and Hall of Botany donated by Mr. Henry Phipps, several statues, and handsome bridges.

Highland park, in the N. E., is almost as extensive as Schenley park, and contains two city reservoirs, an artificial lake, zoological gardens, the main building of which was a gift of the late C. L. Magee, and various statues. The principal entrances, on Highland and Stanton avenues (the latter being one of the most curiously tortuous streets in the city), are ornamented with artistic columns and sculptures. A number of small parks are found in different portions of the city, several of them, such as Grandview, Maple, and West End, being in the section S. of the rivers. The most extensive cemeteries are Allegheny, in the N.; Homewood, in the E.; and Calvary, in the S. The two former are noted for the magnificence of their statuary.

The principal parks and cemeteries are connected with one another and with the downtown district by the Grant and Beechwood boulevards. The former starts from the business quarter and tends toward the Allegheny cemetery and Highland park, while the latter starts S. of Schenley park, and in its winding course skirts Homewood cemetery on the S. and W., and Highland park on the W. With the roadways in the parks, the boulevards form a continuous drive of over 22 miles.

Buildings, Hotels, Clubs, Theaters.—The most noted public building in the city is the county court house, erected by H. H. Richardson, on Fifth avenue and Grant street. It is Romanesque, surmounted by a tower 320 feet high, and was completed in 1888 at a cost of \$2,500,000. A "bridge of sighs" over Ross street connects it with the massive jail. To the E., on Smithfield street, is the extensive post office building, comprising also the custom house and the various Federal courts and offices. The United States arsenal is to the W. of Allegheny cemetery. The city hall is two blocks above the post office, on Smithfield street. The Block House, at the Point, is the only remnant of Fort Pitt. Near by, on the S. bank of the Allegheny river, are the Exposition buildings, in which a general exposition is held every autumn for six weeks. Among the numerous office and business buildings are the Farmers' Deposit National Bank, 24 stories high; the Frick building, 20 stories, of granite; the German National Bank, National Bank of Commerce, Bank of Pittsburg, Union Trust Company, People's Bank for Savings, Stock Exchange, and Arrott buildings. The principal hotels are the Schenley, Henry, Duquesne, and Lincoln. The leading theaters are the Nixon, opened in 1903 at a cost of \$1,500,000; Bijou, Alvin, Belasco, Grand, and Gayety. Among the prominent clubs, mostly housed in fine buildings of their own, are the Pittsburg, Duquesne, Union, University, Monongahela, Allegheny Country, Twentieth Century, Pittsburg Country, and

Pittsburg Golf. Other notable buildings are mentioned under *Churches and Charities* and *Education*.

Churches and Charities.—In 1907 there were 397 churches in Pittsburg and Allegheny, many of them beautiful edifices. Among the more notable ones in Pittsburg may be mentioned the East Liberty, Shadyside, Bellefield, First and Third (Presbyterian); First and Sixth United Presbyterian; Trinity, Calvary, St. Peter's, and Ascension (Protestant Episcopal); Christ (Methodist Episcopal); St. Paul's Cathedral and St. Augustine's (Roman Catholic). The first settlers in Pittsburg were Scotch-Irish, and Presbyterianism is widely prevalent. The city is the seat of the Presbyterian Board of Missions to the Freedmen, and of Roman Catholic and Protestant Episcopal bishops.

There are 22 hospitals in Pittsburg and Allegheny, with about 3,000 beds, and 62 asylums and infirmaries. The largest hospital is the Western Pennsylvania in the main city, with an insane asylum at Dixmont, a suburb; other large hospitals being the Mercy, St. Margaret's Memorial, Charity, South Side, Homœopathic, Passavant, and Eye, Ear, and Throat. The numerous charitable institutions include the Church Home (Prot. Episc.); St. Joseph's Protectory for boys, St. Paul's Orphan Asylum (at Idlewood), House of the Merciful Saviour, and Home for the Aged (R. C.); Old Ladies' Home, at Wilkinsburg (Un. Presb.); Odd Fellows' Home for Widows and Orphans (at Ben Avon), Florence Crittenton Home, Newsboys' Home, and Home for Incurables. The Kingsley House Association is a college settlement. The Carnegie Relief Fund has an endowment of \$4,000,000 and the Carnegie Hero Fund one of \$5,000,000. The value of the real estate and endowments of charitable institutions in the two cities in 1906 was estimated at \$22,000,000 and their expenditures at \$3,000,000 (exclusive of churches).

Education.—At the head of the educational institutions of Greater Pittsburg stands the undenominational Western University of Pennsylvania. It was founded about 1770, received the title of Pittsburg Academy in 1786, and its present title in 1819, when it became a college. In 1892 it was converted into a university, and in 1895 became coeducational. At present it embraces a college, departments of engineering, law, medicine, dentistry, pharmacy, the Allegheny Observatory, and graduate courses leading to the higher academic degrees. It has a library of 15,000 volumes, and nearly 1,000 students. The Western Theological Seminary (Presb.), in Allegheny, has a library of 30,000 volumes, and there are also seminaries of the United and Reformed Presbyterian churches. The Penn-

sylvania College for Women, founded in 1869 under Presbyterian auspices, includes a college, a preparatory school, and schools of art and music. It has a library of 10,000 volumes, and nearly 300 students. Among the denominational and private academies may be mentioned the Academy of Our Lady of Mercy, for girls, and the College of the Holy Ghost (R. C.), Bishop Bowman Institute (Meth. Episc.), and the Pittsburg and Shadyside academies. The Carnegie Institute, to which the founder, Andrew Carnegie, has given \$18,100,000 and an endowment of \$6,000,000, includes a free library, with about 260,000 volumes, and several branch libraries; a music hall with 2,000 seats, in which the Pittsburg Orchestra gives annually a series of performances; an art gallery, in which international exhibitions are held; a scientific museum, devoted chiefly to natural history and containing the Bayet collection of 100,000 fossils, but including also historical relics, etc. The Technical Schools, with a special endowment of \$2,000,000, consisting of schools of applied science, applied design, apprentices and journeymen, and a technical school for women, have enrolled 3,500 pupils. The buildings of the Institute, near the Forbes entrance of Schenley park, cover 6 acres, and have cost nearly \$7,000,000, the entire sum having been contributed by Andrew Carnegie. A number of scientific and art societies, such as the Academy of Science and Art, Engineers' Society of Western Pennsylvania, Architects' Society, Botanical Society, and Art Society, hold their meetings in the rooms of the Institute. The Carnegie free library in Allegheny has over 60,000 volumes, and there are also Carnegie libraries in Braddock, Carnegie, Homestead, McKeesport, Duquesne, and other places in Allegheny co.

The public school system of Pittsburg consists of 87 elementary and 3 high schools, with a total enrollment of about 40,000 pupils, of whom 2,400 are in the high schools, and 1,200 teachers. The high schools offer academic, normal, and commercial courses. Manual training courses are given in some of the elementary schools, and the vacation schools and playgrounds are chiefly devoted to manual, physical, and domestic training. There are 41 kindergartens in Pittsburg, conducted by the Pittsburg and Allegheny Free Kindergarten Association, but maintained almost entirely from public funds. The annual public school expenditure is about \$3,000,000. The administration of the public schools is carried on through local elective boards, with power to levy local taxes, erect schools, appoint teachers, etc.; and a central board of education, composed of 42 members, elected by the local boards, one for each board, with power to fix salaries, adopt courses of study, supply text books, etc., and with

exclusive control over the high schools, manual training, and other special instruction. Several of the school buildings recently erected are architecturally notable.

There are published in Pittsburg 10 daily newspapers, including 2 in German and 1 in Slovenian, besides a large number of weeklies and monthlies devoted to particular religious denominations or special business interests, some of which have extensive circulations. The "Gazette," established in 1786, is the oldest of the dailies.

Industries.—The fame of the "Smoky City" rests on its position as one of the great "workshops of the world," particularly in the production of iron and steel. This position is mainly due to the abundance of cheap fuel. The city is situated in the heart of the vast bituminous coal field of western Pennsylvania, now estimated to contain over 29,000,000,000 tons of coal. The annual coal production of Allegheny and near-by counties—Fayette, Westmoreland, Washington, Armstrong, Clearfield, Cambria, etc.—is about 85,000,000 tons, the consumption in the Pittsburg district having been estimated at 17,500,000 tons for 1905. The production of coke in the Connellsville and Pittsburg districts amounted in 1905 to 17,456,107 tons. Adjacent to Pittsburg is a rich petroleum territory, which produced in 1906 7,476,786 barrels of 42 gallons each. Natural gas was first utilized for industrial purposes in 1886, when it was conveyed in pipes from Murrysville, a distance of 19 miles. The local supply soon began to fail, and pipes were laid into the mountains of West Virginia to bring in a new supply. The several lines of pipes by which gas is conveyed to the city have a combined length of 1,300 miles, and a number of the great plants have acquired control over hundreds of thousands of acres of gas-producing land. Over one-half the gas now consumed—averaging 250,000,000 cubic feet daily in 1906—is for domestic purposes, and the rolling mills are reverting to the use of coal and other fuels. The iron ore of the city's leading industry is derived mainly from the Minnesota and Wisconsin fields.

It is impossible to present an adequate statistical account of the industrial activity of Pittsburg, partly for the reason that many of the greatest plants are located outside the city limits, and partly because some lines of production are so completely dominated by one or a few great plants that it is impossible to publish the statistics without disclosing individual operations. Thus estimates must largely supplement the incompleteness of the census reports. Among the great iron and steel plants are the Edgar Thomson works, producing chiefly steel rails, with an annual capacity of 1,100,000 tons of metal; the Homestead Steel works, with an annual capacity of 425,000 tons of Bessemer steel

ingots and 1,500,000 tons open-hearth steel, while the plate mills can make 500 tons of nickel-steel armor plate per day; the Duquesne Steel works, 3 miles above Homestead, on the Monongahela, having an annual capacity of 750,000 tons of pig iron, 600,000 tons of Bessemer steel ingots, and 820,000 tons of blooms, billets, bars, and slabs; the Rankin works, with five blast furnaces yielding 672,000 tons of pig and spiegel iron annually; the American Bridge works at Ambridge, 20 miles below Pittsburg, on the Ohio, the largest and most modern plant of its kind in the world; the Oliver Iron and Steel Company. These and other plants have been consolidated in the United States Steel Corporation, which owns its own coal and iron mines and means of transportation. The Crescent Steel works and the Pressed Steel Car Company are important industries. The Jones and Laughlin Steel Company, the only great independent steel plant in Pittsburg, also owns its own sources of coal and ore supply and means of transportation. Its coke ovens, blast furnaces, Bessemer and open-hearth steel plants, cold rolling mills, and structural iron works are situated on the N. and S. banks of the Monongahela. In 1906 there were in Allegheny co. 47 blast furnaces, with an annual capacity of 6,600,000 tons; 14 Bessemer converters, with a capacity of 3,500,000 tons; and 169 open-hearth furnaces, with a capacity of 5,000,000 tons. The production of iron and steel in the Pittsburg district (by which is meant a territory within a radius of 40 miles from Pittsburg) in 1905 was as follows: Pig iron, 5,410,890 tons; steel ingots and castings, 6,593,117; steel rails, 743,612 tons.

Next to the production of iron and steel, the greatest industry is that of iron and steel manufactures. The manufacture of structural shapes amounted to 881,932 tons in 1905, and of sewer pipe 609,000 tons in 1906. In 1906 1,000,000 tons of steel were consumed in the production of 80,000 steel cars by 47,500 men. In the same year the value of underground cable and wire for telegraph and telephone lines was estimated at \$15,000,000; of railway switch and signal appliances, \$5,100,000; of air brakes, \$10,416,000; of electrical and auxiliary apparatus, \$45,000,000. The Westinghouse Electric works at East Pittsburg employ 12,000 men. The manufacture of glass is still very important, although a large number of plants have removed to regions of cheaper gas, and the production of plate, window, pressed, lamp, electric, and other glass amounted in 1905 to \$38,000,000. The high-grade silica and fire brick used in the steel and glass furnaces, formerly supplied by England, are now made in Pittsburg out of the fine clay deposits in Ohio and Kentucky, owned by the Pittsburg plants. The

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largest cork manufacturing plant in the world is located at Pittsburg. It controls cork forests in Spain and Portugal, and employs 1,200 workers, mostly women, in turning out corks for bottles, life preservers, mats, shoes, soles, etc., valued at \$2,500,000 annually. The output of manufactured copper is about 6,000,000 pounds a year. Pittsburg capitalists control copper mines in Michigan and the West, and the presence of one of the largest electrical apparatus plants in the world affords a ready market for copper manufactures. The value of pickled and canned goods amounts to \$7,500,000 a year, and the Heinz pickling and preserving plant in Allegheny has its own glass works and uses the products of 18,000 acres planted with vegetables. A contrast to the generally massive products of the district is afforded by the manufacture of lenses, optical goods, and astronomical instruments of the highest delicacy and perfection. In the Spanish-American War "Pittsburg range-finders were used to aim more correctly Pittsburg projectiles."

In round numbers there are in the Pittsburg district 3,000 manufacturing establishments, with 250,000 employees, \$640,000,000 of invested capital, \$550,000,000 worth of annual product, and a pay-roll amounting to \$350,000,000. According to the Census of Manufactures of 1905, the number of

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steel works and rolling mills, forgings, bolts, nuts, and rivets, 26,105 and \$89,604,000; malt liquors, 603 and \$3,167,000; lumber and planing mill products, 385 and \$1,161,000; printing and publishing, including newspapers and periodicals, 2,459 and \$7,279,000; slaughtering and meat packing, 273 and \$3,510,000; steel springs for cars and carriages, 271 and \$1,159,000; steam fittings and heating apparatus, 977 and \$1,506,000; structural ironwork, 699 and \$1,566,000; tin and terne plate, 236 and \$1,646,000; tobacco, cigars, and cigarettes, 2,130 and \$2,297,000. Other important industries were brick and tile, carriages and wagons, chemicals, manufactured ice, paints, pottery, terra cotta and fire clay products, tinware, tools, automobiles, brass and brass ware, coke, cork cutting, foundry supplies, professional and scientific instruments, gas machines and meters, iron and steel doors and shutters, nails and spikes, wrought-iron pipe, locomotives, ordnance and ordnance stores, refined petroleum, pickles, preserves, and sauces, printing materials, including ink, roofing materials, safes and vaults, wooden and iron and steel shipbuilding, stereotyping and electrotyping, stoves and furnaces. The growth of the city's industries since 1880 is shown in its leading features in the following tables:

Year.	Number of Establishments.	Capital.	Wage-earners.	Wages.	Cost of Materials Used.	Value of Products.
1880	1,112	\$52,645,000	36,930	\$17,168,000	\$42,110,000	\$75,915,000
1890	1,420	108,369,000	52,963	29,889,000	69,892,000	126,860,000
1900	1,938	193,163,000	69,977	36,685,000	116,833,000	203,261,000

wage-earners (exclusive of salaried officials and clerks) employed in, and the value of the products of, the leading industries in the city of Pittsburg, exclusive of its environs, were as follows: Bread and other bakery products, 1,392 wage-earners and \$5,008,000 worth of products;

The special United States Census of Manufactures of 1905 was confined to industries carried on under the factory system, to the exclusion of hand trades and neighborhood industries. Compared with the corresponding figures for 1900, the results are shown in the following:

Year.	Number of Establishments.	Capital.	Wage-earners.	Wages.	Cost of Materials Used.	Value of Products.
1900	928	\$160,570,000	52,240	\$28,018,000	\$97,626,000	\$165,003,000
1905	1,117	202,424,000	56,229	31,541,000	97,945,000	165,429,000
Percent increase	26.8	26.1	7.0	12.6	0.3	0.3

cars and general shop construction and repairs by steam railroad companies, 3,237 and \$3,727,000; men's clothing, 655 and \$1,248,000; electrical machinery, apparatus, and supplies, 537 and \$1,797,000; foundry and machine-shop products, 4,453 and \$9,632,000; glass, and glass cutting, staining, and ornamenting, 2,241 and \$2,700,000; iron and steel blast furnaces,

The insignificant increase in the last two items in the second table may be partly ascribed to the great depression in the iron and steel industry during the first half of 1904, the year for which the census was taken, and partly to the removal of several glass plants. In some measure, however, the decrease is more apparent than real, being caused by the elimination in the last

census of certain duplications in the earlier censuses.

Commerce and Transportation.—The situation of the city is extremely favorable to the development of a large commerce. The Monongahela is navigable 130 miles S. to the coal fields of West Virginia, as far as Fairmont, and the Allegheny about 100 miles N. The Ohio connects Pittsburg with the Mississippi valley ports, as far as New Orleans, 2,000 miles distant. Numerous movable dams have improved the natural advantages for water transportation. The Davis Island dam on the Ohio, 5 miles below Pittsburg, opposite Bellevue, makes a lake 8 miles long, which affords a fine harbor even in periods of drought. The traffic on the Monongahela river between Pittsburg and Fairmont, W. Va., amounted in 1906 to 1,544,732 tons upstream, nearly all sand and gravel, and 10,163,101 tons downstream, nearly all bituminous coal. The traffic by way of Davis Island dam amounted in 1906 to 64,614 tons upstream and 3,044,583 tons downstream, nearly all coal. The projected Lake Erie and Ohio ship canal will give Pittsburg a 15-foot waterway to Lake Erie, at an estimated cost of \$33,000,000, which will greatly reduce the cost of transportation of iron ore to Pittsburg, and of coal and coke to the lake ports. The freight traffic of the vast network of railroads entering the city amounted in 1906 to 113,000,000 tons; of the harbor, 9,000,000 tons. Within the city there are over 250 miles of electric railway, and over 160 miles in the rest of Allegheny co., the whole being operated by one company. Direct foreign imports amounted in 1906 to \$2,600,000.

There were in 1906 31 National banks in Pittsburg, with \$23,000,000 of capital, \$38,034,000 surplus and profits, and \$244,774,000 resources and liabilities. In the entire county there were in 1906 179 banks and trust companies, with \$175,217,000 of capital, surplus, and undivided profits, \$304,974,000 loans, \$149,715,000 invested securities, \$395,380,000 deposits, and \$593,392,000 total resources. The clearing house transactions of Pittsburg amounted in 1906 to \$2,630,996,000.

Administration and Public Interests.—The city is governed by a mayor, who appoints, with the consent of the select council, the city treasurer, directors of the departments of public works, safety, law, and charity, and the police justices. The comptroller is elected by popular vote. The council is bicameral. The annual municipal expenditure is about \$8,000,000, and the municipal debt amounted in 1906 to \$14,776,000. The city owns its water works; the supply, drawn from the Allegheny, is neither adequate nor good. A filtration plant costing \$7,000,000 is (1907) nearly

finished. There is a municipal hospital for contagious diseases.

History and Population.—By the middle of the eighteenth century both the French and the English had recognized the strategical importance of "the land in the forks." In 1753 George Washington was sent by Governor Dinwiddie of Virginia to warn the French against making further advances in this direction. The following year a small detachment of Virginia militia began here the construction of a fort, but withdrew on the approach of a superior French force, who erected Fort Duquesne. On July 9, 1755, a large British force under General Braddock met with disastrous defeat about eight miles from the fort. Major Grant, with 800 men, attempted to surprise the fort on Sept. 14, 1758, but suffered defeat on the site now occupied by the court house and Frick building. In the meantime 7,500 men under General Forbes were marching from Philadelphia against the place, and on Nov. 25, when the British were within fifteen miles of it, the French burned the fort and withdrew. The following day Forbes occupied the place and named it "Pittsburgh" (the spelling still preserved in the great seal of the city) in honor of the great war minister. Fort Pitt, constructed the following year, was besieged by the Indians during Pontiac's War in 1763 (June 27—Aug. 6), but was relieved. A brick block house near the fort, erected in 1764, by Col. Henry Boquet, the conqueror of Pontiac, is the only structure of colonial times preserved in Pittsburg. A town was platted in 1764, and in 1781 the jurisdiction, which was disputed by Virginia, passed definitely to Pennsylvania. Allegheny co. was organized in 1788, Pittsburg becoming the county-seat in 1791, a borough in 1804, and a city in 1816. A number of boroughs S. of the Monongahela were annexed in 1872, and the municipal limits have been extended since. In accordance with an act of the legislature, the citizens of Pittsburg and Allegheny voted in June, 1906, upon the question of consolidation, with the result that a majority of the former voted for it, and a majority of the latter against it. The matter is now pending in the United States Supreme Court, but the ultimate consolidation into one municipality of the entire county appears to be only a question of time. Two great strikes, the railroad strike of 1877 and the Homestead strike of 1892, were accompanied with violence and bloodshed, and attracted the attention of the whole country.

The growth of the city's population has been as follows: 1800, 1,565; 1810, 4,768; 1820, 7,284; 1830, 12,542; 1840, 21,115; 1850, 46,601; 1860, 49,221; 1870, 86,076; 1880, 156,389; 1890, 238,617; 1900, 321,616; 1910 (census), 533,905. In 1900 the

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population consisted of 165,646 males and 155,970 females. In the same year the negroes numbered 17,040, making 5.3 per cent. of the total, and the foreign born 84,878, making 26.4 per cent. of the total. Among the latter, the most numerous elements were 21,222 Germans, 18,620 Irish, 13,705 English, Scotch, and Welsh, 11,184 Poles, 5,752 Canadians, 5,709 Italians, and 4,107 Russians.

Revised by WILLIAM M. LONG.

Pittsburg, a city of Texas, county-seat of Camp co. It is situated in the N. E. part of the State, about 108 miles N. by E. of Dallas, on the Missouri, Kansas, and Texas and the St. Louis Southwestern railroads. Pop. (1900) 1,783.

Pittsburg, University of. See WESTERN UNIVERSITY OF PENNSYLVANIA.

Pittsfield, a city of Massachusetts, county-seat of Berkshire co. It is in the W. part of the State, about 6 miles from the New York line, 40 miles N. W. of Springfield, on the Housatonic river, and the New York, New Haven, and Hartford, the Boston and Albany, and other railroads. It occupies a beautiful site on a plateau 1,010 feet above sea level, surrounded by hills. Within the municipal limits are a number of villages. The public green in the center of the city contains a striking statue, "The Color Bearer," a reproduction of which stands on the field of Gettysburg. Among the notable buildings are the white marble court house; the Berkshire Athenæum, containing the rooms of the Berkshire Historical Society, the public library of 50,000 volumes, and the museum and art gallery; the Cathedral of St. Joseph (R. C.) and some other churches; the public high school; the Bishop Training School for Nurses, House of Mercy, and County Home for Aged Women. Here are the headquarters of the Agassiz Association (*q. v.*). There are many attractive residences, the city and surroundings being a favorite summer resort.

The manufacturing industries include worsted, silk, and knit goods, electrical apparatus, foundries and machine shops, lumber and planing mills, stationery, surgical appliances, etc. The textile manufactures, woollens being most important, represent over one-half the value of all manufactures. According to the census of 1905, there were (exclusive of hand and neighborhood trades) 44 factories with \$8,035,000 of capital and 4,455 laborers receiving \$2,082,000 in wages, using materials valued at \$4,473,000, and turning out products valued at \$8,577,000. The city administration is in the hands of a mayor, council, and school committee popularly chosen, and other officials appointed by the mayor or council. The place was settled in 1743, incorporated as a town under its present name in 1761, and chartered a city in 1891. Pop. (1890)

Pius

17,281; (1900) 21,766; (1905, State census) 25,001; (1910, U. S. Census) 32,121.

Pittston, a city in Luzerne co., Pa., on the Susquehanna river, and on the Lehigh Valley, the Erie and Wyoming Valley, the Lackawanna and other railroads; 9 miles S. W. of Scranton. Here are waterworks, gas and electric lights, several banks, and a number of daily and weekly newspapers. It is chiefly a mining town, though there are several manufacturing industries, including knitting mill, a silk mill, foundries and stove, car-wheel, engine, and iron roofing works. The city was settled about 1770, was incorporated as a borough in 1853, and became a city of the third class in 1894. Pittston has an assessed property valuation of nearly \$1,500,000. Pop. (1900) 12,556; (1910) 16,267.

Pituitary Body, a small reddish-gray mass divided into an anterior and a posterior lobe, and occupying the *sella turcica* of the sphenoid bone. Formerly called the pituitary gland, from the erroneous belief that it discharged mucus into the nostrils.

Pit Villages, collections of earth caves, dug in the ground and covered with stones, wooden or wattle lids, or clay or sods of turf. They were used by prehistoric races or by races at the lowest stages of barbarism. A good example was unearthed during the latter half of the 19th century near St. Mary Bourne, N. E. of Andover, in Hampshire, England. The pits are reached by entrance shafts, sloping downward. The pits themselves are oval or pear-shaped, varying between 22 and 42 feet in length, and are about 12 or 13 feet wide, and 5 feet high, with the fireplace in the center. Flint and bone implements and rude pottery have been found in them.

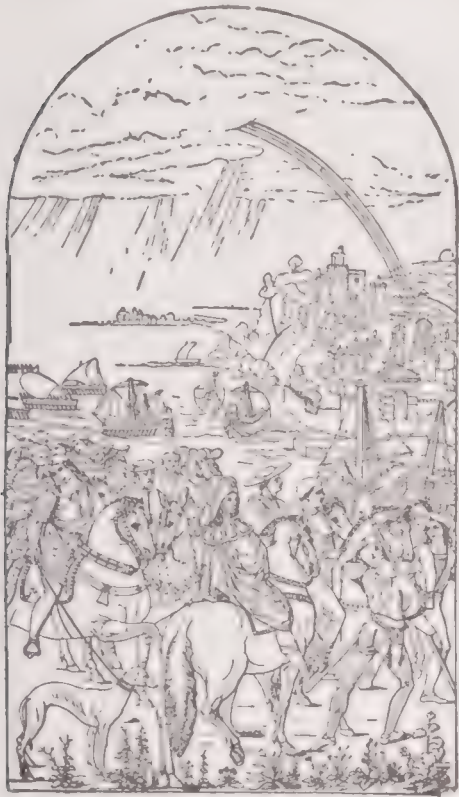
Pityriasis, a chronic and non-contagious inflammation of the skin, manifesting itself in red spots or patches on which minute scales are produced, thrown off as soon as formed, and as quickly renewed. It may affect any part, and, though seldom, many parts of the body at the same time; but the commonest is the *P. capitis*, on the head, when the scales are popularly known as scurf or dandruff. Mild forms generally yield to warm bathing and a light diet, if persevered in; but more obstinate cases can only be thoroughly cured by radical change in the system, produced by suitable regimen and treatment.

Pityoussa. See SALAMIS.

Pius, the name of a number of Popes, as follows:

PIUS I., succeeded Hyginus in 142, and died in 157.

PIUS II. (Æneas Sylvani Piccolomini); born in Tuscany in 1405, of an ancient and illustrious family. In 1431 he assisted at



POPE PIUS II.

Departing for the Council of Basel.

cardinal. Pius had by this time given up the more liberal opinions on church matters with which he started, and had be-



POPE PIUS II.

come a zealous supporter of the power of the Pope, both in opposition to the secular power and to the authority of councils. He was one of the most learned men of his time, and notwithstanding the great change in his views, he distinguished himself by moderation and a conciliatory spirit. He was chosen to succeed Calixtus III. in 1458, and in the following year assembled a congress at Mantua for the purpose of arranging a crusade against the Turks. He soon after published a bull against appeals to a council, which occasioned some dispute with Louis XI. In 1463, by another bull, he retraced his former sentiments respecting the Council of Basel condemning his defense of it, and praying to be condemned as Æneas Sylvius, but listened to as Pius II. Among the writings of Pius II. are a "History of the Council of Basel"; "History of Frederick III.";

"History of Bohemia"; "Cosmographia," etc. He died in Ancona, August, 1464, whither he went to hasten preparations for war with the Turks.

PIUS III. (Francesco Piccolomini), nephew of the preceding pontiff. He was elected Pope in 1503, but died in less than a month afterward.

PIUS IV. (Cardinal de Medici); born in Milan, in 1499. He rose by merit to several high employments, and, in 1549, obtained the cardinalship, and, on the death of Paul IV., in 1559, was elected Pope. He confirmed the decrees of the Council of Trent, after the closing of that assembly in 1564. In the following year a conspiracy was formed against his life by Benedict Accolti and others, who were executed. This Pope was not of the celebrated Medici family of Florence. He died in 1565.

PIUS V. (Michele Ghislieri); born in Redmont in 1504, and early entered the Dominican order. He so distinguished himself by his austere life, and his zeal against "heretics," that he was appointed inquisitor in Lombardy, and afterward inquisitor-general. He was created cardinal in 1557, and was chosen to succeed Pius IV. in 1566. He set himself to effect reforms, both in morals and discipline, excited terror in Italy by the seizure, imprisonment, and burning of those convicted or suspected of heresy, among whom were several persons of note; revived the bull, "In cœnam Domini," but found it impossible to put it in execution; enforced strictly the authority of the Index Expurgatorius; and expelled the Jews from the States of the Church, excepting only the cities of Rome and Ancona. The great victory over the Turks at Lepanto was the result in good part of the efforts of Pius V. His death, in May, 1572, was a matter of general rejoicing, and was publicly celebrated at Constantinople during three days.

PIUS VI. (Giovanni Angelo Braschi); born in Cesena, in 1717, and succeeded Clement XIV., in 1775. His first act was to make a reform in the public treasury; he then completed the museum in the Vatican; but the greatest work of his pontificate was the draining of the Pontine marshes—a project which baffled several of the emperors, and many Popes. When the Emperor Joseph II. decreed that all the religious orders in his dominions were free from papal jurisdiction, Pius, apprehensive of the consequences of such a measure, went in person to Vienna in 1782; but though he was honorably received, his remonstrances were ineffectual. The French Revolution, however, was of more serious consequence to the Papal See. The Pope having favored the allies, Bonaparte entered the ecclesiastical territory, and compelled him to purchase a peace by a contribution of several

Pius

millions, and delivering up the finest works of painting and sculpture. Basseville was then sent as envoy from the republic to Rome, where he behaved with so much insolence, that the people assassinated him in 1793. General Duphot entered the city with his troops to restore order, but the papal soldiers routed them, and Duphot was



PIUS VI.

slain. On this Bonaparte again entered Italy, and made the Pope prisoner in the capitol, which was plundered. The venerable pontiff was carried away by the victors, and hurried over the Alps to Valence, where he died Aug. 29, 1799.

PIUS VII. (Gregorio Barnaba Chiaramonti); born in Cesena, in 1742; became a Benedictine monk; was created cardinal in 1785, and after the death of Pius VI., was chosen, after long deliberations of the conclave, to succeed him, March, 1800. In the following year a concordat with France was concluded at Paris; in 1804 the Pope went to Paris and crowned Napoleon emperor, returning to Rome in May, 1805. Soon after Ancona was seized by the French, and the great quarrel between Napoleon and the Pope began. The occupation of the castle of San Angelo in 1808 was followed by the annexation of the States of the Church to the French empire; on which the Pope published a bull of excommunication against the perpetrators of the invasion. Pius was then arrested by the French officer Miollis and sent to Savona, and afterward to Fontainebleau, whence he was not permitted to return to Italy till January, 1814. The Congress of Vienna restored the States of the Church to the Pope, who applied himself thenceforth to internal reforms. He, however, reëstablished the Jesuits and the Inquisition. The character of Pius VII. was such as to win him the esteem and sympathy of men of all Churches and sects. He died Aug. 20, 1823,

Pius

PIUS VIII. (Cardinal Castiglione), became Pope in succession to Leo XII., in 1829. After a short pontificate of one year, he died in 1830.

PIUS IX. (Giovanni Mario Mastai Ferretti); born in Singaglia, May 13, 1790; was intended for the army, but resolved to devote himself to the Church. For several years after his ordination he attended to his pastoral duties with exemplary self-devotion, and was nominated by Pius VII. on a mission to the government of Chile, shortly after the recognition of the independence of that republic. The duties of this mission were performed by him with great discretion; and immediately on his return to Rome he was appointed by Leo XII. to one of the most important of the ecclesiastico-civil departments of administration. In 1836 he was sent as apostolic nuncio to Naples, while the cholera was raging there, and his name is still revered by the poorer inhabitants of that city, in gratitude for his disinterested efforts to alleviate their sufferings. In 1840 he was created Cardinal-Archbishop of Imola, in the Romagna, where much political disaffection existed; but he devoted himself to the duties of his diocese with so much zeal and self denial, and displayed such liberality of sentiment, that he soon gained the affections of the people, and restored peace and tranquillity to the district. Pope Gregory XVI. died June 1, 1846, and Cardinal Ferretti was elected to the papacy under the name of Pius IX., June 16. The new Pope at first acquired much popularity by favoring the hopes and wishes of the people for the reform of the abuses of the government; and the enthusiasm, not only of the Romans, but of the whole Italian people, was raised to the highest pitch. But the French Revolution of 1848 gave a much more powerful impulse to the enthusiasm, not only of the Italian patriots, but of the friends of liberal institutions all over Europe; awakening a demand, not for mere administrative reforms, but for popular systems of representative government. These sweeping changes the Pope was not prepared to support, and from that moment his popularity began to decline. The popular disaffection was greatly increased on his taking for his minister Count Rossi, one of the most aristocratic and unpopular men in Rome, when, indeed, the fury of the people could with difficulty be restrained. Count Rossi was assassinated Nov. 15, and Pius himself, a few days later, escaped from Rome in disguise, and arrived safely in Gaëta, the first town in the Neapolitan territory, whither he was followed by the members of the papal court and the diplomatic corps. He sent to Rome an ordonnance, Nov. 27, declaring void all the acts of the government, which he

superseded by a state commission. This document the Roman chambers treated with contempt, appointed a provisional government, and set about improving the victory they had achieved. The Pope remained nearly a year and a half at Gaëta and Portici, an object of sympathy as the head of the Roman Catholic Church. During his absence, Rome, which was in the possession of the native troops under Garibaldi, was besieged, and at last taken by storm by the French army under General Oudinot, after sustaining some reverses. The Pope left Portici, April 4, 1850, escorted by Neapolitan and French dragoons, and accompanied by the King of Naples and several members of his family. He crossed the frontier at Terracina, April 6, and reëntered Rome April 12, amid the thunder of French cannon. His chief ecclesiastical acts are the formal definition of the dogma of the Immaculate Conception, in December, 1854; the famous encyclical of December, 1864, which was provoked by the Franco-Italian convention, providing for the withdrawal of the French troops from Rome—an act which was, however, practically annulled by the return of the French forces in 1867, in consequence of an attempt at invasion by Garibaldi; and the bull summoning the Ecumenical Council of 1869–1870, which promulgated the doctrine of papal infallibility. In September, 1870, the French troops were withdrawn from Rome, and in October the States of the Church were annexed to the kingdom of Italy, thus ending the temporal power of the Popes. He died Feb. 7, 1878.

PIUS X. (Giuseppe Sarto), was born in Riese, Province of Venice, Italy, June 2, 1835; was educated at the College of Castelfranco and at the Seminary of Padua; was ordained in 1858, and labored as a parish priest in the Province of Venice. In 1875 he became chancellor of the diocese of Treviso, afterward spiritual director of the seminary, examiner of the clergy, judge of the ecclesiastical court, vicar of the chapter of Treviso, and Bishop of Mantua in 1884. On June 12, 1893, he became a cardinal and patriarch of Venice, and titular of the church of St. Bernardo alle Terme, in Rome, and in 1903 succeeded the late Leo XIII. as Pope. It is said that Sarto was often referred to by the late Pope as his probable successor; but his name was not prominent as a candidate in the early balloting, Cardinals Rampolla and Vanutelli being more conspicuous. Sarto was finally suggested as a compromise candidate, and was elected on the sixth ballot, Aug. 4, a choice which gave great satisfaction throughout Austria, France, and Germany. The coronation ceremony took place in the Basilica of St. Peters on Sunday, Aug. 9, following, more than 20,000 people being congregated in and about St. Peters. The new Pope is a man of deep

learning, exceedingly simple in tastes and modest in bearing, fond of company and outdoor life, skilled in diplomacy, and strong-willed in the exercise of his rights. Personally, he much preferred the freedom of his post at Venice to all the honors of his new office.

Pizarro, Francisco, a Spanish explorer, the conqueror of Peru; the illegitimate son of a gentleman of Truxillo, being left entirely dependent on his mother, a peasant girl, he received no education; was, in his early years, employed as a swineherd. Quitting this inglorious occupation, he embarked in 1510, with some other adventurers, for America; and, in 1524, after having distinguished himself under Nuñez de Balboa on many occasions, he associated at Panama with Diego de Almagro and Hernandez Lucque, a priest, in an enterprise to make fresh discoveries. In this voyage they reached the coast of Peru, but being too few to make any attempt at a settlement, Pizarro returned to Spain, where all that he gained was a power from the court to prosecute his object. However, having raised some money, he was enabled again, in 1531, to visit Peru, where a civil war was then raging between Huascar, the legitimate monarch, and his half-brother, Atahualpa, or Atabalipa, as he is variously called, the reigning inca. Pizarro, by pretending to take the part of the latter, was permitted to march into the interior, where he made the unsuspecting king his prisoner, while partaking of a friendly banquet to which he had invited him and his whole court; then extorting from him, as it is said, a house full of the precious metals by way of ransom, he had him tried for a pretended conspiracy, and condemned him to be burned, allowing him first to be strangled, as a reward for becoming a Christian. In 1533 the conqueror laid the foundation of Lima; but, in 1537, a contest arose between him and Almagro, who was defeated and executed. Pizarro was murdered by Almagro's followers, June 26, 1541.

Pizarro, Gonzalo, half brother of the preceding; born in 1502. His brother appointed him governor of Quito in 1540, and after the assassination of Francisco, he raised an army against the new viceroy, Blasco Nuñez, and the latter was defeated and slain near Quito in 1546. But Pizarro did not long enjoy his success, being beaten, taken prisoner, and beheaded in 1548.

Pizzicato, a direction to players on bowed instruments to produce the tone by plucking the string with the finger, instead of using the bow.

Placenta, in anatomy, the organ by which the foetus is connected with the mother, and vascular connection between the two maintained. It ultimately comes away as the afterbirth. Called also uterine cake. In botany, the part of the ovary from which

Placitum Regium

the ovules arise. It generally occupies the whole or a portion of an angle of each cell. When elongated so as to constitute a little cord it is called the umbilical cord. The placenta is formed at some part of the ventral suture, has the two margins distinct or combined, that of the carpellary leaf folded inward. Thus, the placenta will always be turned to the axis. There may be one placenta or more than one.

Placitum Regium, an act or instrument executed in virtue of the privilege claimed by the government in certain kingdoms to exercise a supervision over the communications of the Roman pontiff with the clergy and people of those kingdoms, and to suspend or prevent the publication of any brief, bull, or other papal instrument which may appear to contravene the laws of the kingdom, or to compromise the public interest. The early Christian emperors, it is well known, freely extended their legislation into the affairs of the Church; and one constant cause of conflict between Church and State in the mediæval period was the attempt on the part of the sovereigns to control the free intercourse of the Pope. In the Pragmatic Sanction in France, and in the similar legislation of Spain, Portugal, Sicily, and the Low Countries during the 15th century, the claims of the State are asserted; and among the so-called "liberties" of the later GALLICAN CHURCH (*q. v.*) was a certain subjection to the State in this particular. But it was in the German States that the claim was most formally embodied in the constitutional law. In England the statute of præmunire was an example of the same tendency.

Placoid, a term used to designate a variety of scales covering the bodies of the elasmobranchiate fishes (sharks, skates, rays, etc.), the *Placoidei* of Agassiz. These structures consist of detached bony grains, tubercles, or plates, of which the latter are not uncommonly armed with spines.

Plagal, in music, the name given to those Church modes which were formed from the four older or authentic modes by taking the fourth below as the new keynote, and proceeding thence to the fifth above. The plagal modes were distinguished by the addition of hupo, *e. g.*, Doric, an authentic mode; hypodoric, a plagal mode formed from the Doric.

Plagiostomi, in ichthyology, a sub-order of *Chondropterygii*. There are from five to seven gill-openings; skull with a suspensorium and the palatal apparatus detached; teeth numerous, mouth transverse, on under surface. It contains the sharks and rays, and is found from the Upper Silurian onward.

Plague

Plagium, the crime of stealing or kidnapping men, women, or children. It was punishable with death.

Plague, a peculiarly malignant fever of the continued and contagious type, now believed to be almost identical with the worst kinds of typhus fever. It is produced by the absorption of a poison generated by decaying animal matter combined with heat, moisture, and bad ventilation. The famines produced by the ravages of locusts, and the subsequent decay of their bodies, often generate it. The period of incubation varies from a few hours to three weeks. It chiefly attacks the cervical, axillary, inguinal, and mesenteric glands, producing buboes, carbuncles, etc. The "boil" from which Hezekiah suffered seems to have been the carbuncle of plague (II Kings xx: 7, Isaiah xxxviii: 21). At first there is great restlessness, followed ultimately by corresponding exhaustion, and death supervenes in two or three days. Grand Cairo is the chief known focus of the plague, the spread of which, in different directions, is at least attempted to be checked by quarantine. The plague seems to have been the black death of the 14th century. It was known by the name of plague when, in 1665, it slew in London 68,596 people, about one-third of the population. The great fire of London (1666) obtains the credit of having banished the plague from the metropolis by destroying the fever nests which it had infested.

In the summer of 1896 a very malignant form of disease, known as the "bubonic" plague, made its appearance in Bombay, India, and spread with great rapidity. The number of cases and deaths finally became so large that a panic ensued, and more than 450,000 people — one-half of the population, fled from the city. The bubonic plague receives its name from the fact that it attacks the lymphatic glands in the neck, armpits, groin, and other parts of the body. In general, the disease is spread in the same manner as cholera, except that the cholera germ must enter the intestinal tract, while the germ of the plague may attack any part of the mucous membrane, or be attended by even the minutest abrasion of the skin. But while this germ is so virile and so easily taken into the system, it is one of the most easily killed by disinfection. One per cent. of quicklime will destroy it.

The Ten Plagues of Egypt were 10 inflictions divinely sent upon the Egyptians to compel them to emancipate the Israelites from bondage and allow them to quit the land. The first plague consisted in the turning of the waters of Egypt into blood; the second, of frogs that covered the land; the third, of lice annoying both man and beast; the fourth, of grievous swarms of flies; the fifth, of murrain that attacked the

live stock; the sixth, of boils "breaking forth with blains upon man and upon beast"; the seventh, a severe thunder storm accompanied by destructive hail; the eighth, a plague of locusts that ate what the hail had spared; the ninth, a darkness that could be felt; the tenth, the death of the firstborn of man and beast among the Egyptians. (Exod. vii: 14, xii: 30. For the use of the word plague see ix: 14, xi. 1.)

Plagues, American. Ancient Egypt in all her tribulations had no more disastrous plagues of flies or lice than were the great insect scourges which visited different sections of the United States in the past, and the gradual passing of these plagues before the work of science marks a new era in our agricultural and industrial life. The story of the terrible scourges form dramatic and picturesque background for the history of the great West, and they are intimately wrapped up and interwoven with the struggles and discouraging hardships of a race of pioneers who lived their tragic lives to conquer an empire for future generations to enjoy. Counties and States equal to half of continental Europe were visited by the plagues of locusts, chinch bugs and grasshoppers, and their entire vegetation laid as bare and waste as if swept by fire.

Some recent statistics have been compiled by the Washington agricultural experts which tend to show that back in 1867 the total annual loss to the farm crops of this country from insect ravages amounted in round numbers from \$200,000,000 to \$300,000,000. One well-informed expert places the losses even higher, or about \$330,000,000. These losses were sustained in different parts of the country, and included insects which attacked the grain, corn, fruits, and animals of the farming States. Some years the breaking loose of hordes of well-known insect foes of grain or fruits would totally destroy the crops and cause such general distress and poverty that starvation seemed to threaten the inhabitants of entire counties and States.

The great locust plagues were among the earliest of the West and Northwest, and those who remember these terrible visitations will never forget the conditions under which farmers were forced to live for months at a time. Men became paralyzed with fear; prayers were offered up in churches and public places to remove the awful plague, and even executive proclamations were issued by the governors of the afflicted States calling for general supplication for divine aid in removing the visitation. In 1877 the Governor of Minnesota issued such a proclamation, appointing the 26th day of April as a day for prayer throughout the State for this purpose. In 1873 considerable damage was

done to the grass and grain crops by the locusts which appeared in Southwestern Minnesota, and by the following season they had spread so that they caused general alarm. Millions of the creatures appeared, and they swept across the country destroying every green thing in their way. So great was the destruction to the crops that an appeal was made to the legislature the following winter, but nothing was done to check the scourge, and in 1875 the swarms had multiplied tenfold.

During that summer, and the two succeeding ones, the scourge spread with alarming rapidity throughout the State, and into adjoining States, till there was such a succession of crop destructions that the inhabitants were reduced to starvation. Efforts were made then to destroy the plague and to invent some means of checking its further spread. Coal oil was distributed throughout the infected districts to destroy the insects, but this primitive and clumsy method seemed to have had little sensible effect in diminishing their numbers.

Farmers and their families spent their summers in destroying locusts. In the Dakotas and Iowa their numbers became so great that people were in despair. It was impossible to raise crops. If they were raised the swarms of locusts would destroy them before they could reach maturity. By the spring of 1875 and 1876 the great Northwest had nearly reached the limit of patience. Bankruptcy stared the whole Northwestern group of States in the face. In the autumn of 1876 the governors of Minnesota, Missouri, Kansas, Nebraska, Dakota, and Iowa met at Omaha to discuss the plague and devise some means of averting the ruin that was paralyzing their fertile land. Eminent entomologists met with the governors in this conference, but all that science could suggest had been tried, and the conference broke up without anything more definite being reached than the calling of a general day of prayer. A strange coincidence, or, as some will have it, a divine answer to the public prayers, followed the 26th day of April set aside for this purpose. A few warm days brought the locusts from their winter hiding places in great numbers, and then a cold wave suddenly developed in the Northwest, and the unhatched larvæ and young insects were almost totally destroyed by the frost which spread over the whole afflicted sections. It was estimated that billions and billions of eggs of the locusts and their young larvæ were destroyed by this cold wave, coming, as it did, right after a few days of balmy spring weather. It was the only thing that saved the Northwest from bankruptcy and from a period of depression that would have lasted to this day. The millions of dollars lost through crop destruc-

Plagues

tion had caused many to emigrate from their homes, leaving their farms in many instances just as they were, and fleeing from the plague as did the ancient Egyptians. The awful screech and noise made by the locusts maddened and crazed men, women, and children, and the days became horrible nightmares which have never since been equaled. The locust plague passed years ago, and for 25 years there have been only occasional reminders of it in visitations of the insects in a few isolated sections. There has been no general spread of it as in 1873-1876. Under modern methods of checking insect development it would be impossible for the locusts ever again to multiply in such vast numbers. There are great locust plagues occasionally in South Africa and South America, and they spread as thickly over the country as they did in the Northwest a quarter of a century ago; but it is not likely that another such visitation will ever appear in this country.

Another great plague, which visited the West 15 and 20 years ago, and which occasionally develops into huge proportions today, is that caused by the chinch bug, which has till quite recently been called the "costliest insect in America." This famous bug has caused a hundred million dollars' worth of damages to crops in a single year. As far back as 1850 the bugs appeared in such numbers that the grain crops of a single State, Illinois, were damaged to the extent of \$4,000,000. It had appeared previous to this in Indiana and Wisconsin, causing considerable injury to the crops. Periodically it appeared then in great numbers in widely separated regions. In 1863 to 1865 it caused great damage, but in 1871 it caused a total loss of over \$70,000,000 to the farmers. But even this was merely a slight indication of what it might do in time. In 1874 it broke loose in Iowa, Missouri, Illinois, Kansas, Nebraska, Wisconsin, and Indiana, and caused total losses of about \$100,000,000. After that season the ravages decreased a little, but reached another great climax in 1887, when the bugs caused fully \$60,000,000 worth of injury to the grain crops. As late as 1896 a chinch bug plague appeared in the West, and caused considerable damage. Altogether the successive plagues of this tiny insect have caused losses to the farmers of the country amounting to over \$330,000,000. Such an immense total is sufficient to make this insect occupy a prominent place in the natural history of the great Northwest. No other insect of either hemisphere has probably caused quite such immense damage, though the Rocky mountain locust or Western grasshopper stands prominently among the most disastrous of our insects. In 1874 the losses incurred by the ravages of the locust were estimated at \$100,000,000. The chinch bug, unlike

Plaice

the grasshopper or locust, has not yet lost its power for evil, and its reappearance in great numbers may be looked for almost any year; but it would be met by far more destructive agencies than in the past, and all the resources of science would be enlisted in the fight against it. The chinch bug is a very small insect to cause so much trouble, and it is hardly discernible to the naked eye, but each female lays about 500 eggs in a season, and the newly hatched insects are very active. The favorite diet of the insects is grain, grass, sorghum, broom corn and Indian corn. Most of the damage has been done in the West to such crops as wheat, barley, rye, and corn. The insect has remarkable immunity from attacks by ordinary enemies, a disagreeable odor emanating from it protecting it from many predatory insects which would otherwise keep down its numbers. There are a few natural enemies to the chinch bug, and entomologists have made a study of different insects and diseases which tend to destroy the creature. Efforts have been made to spread parasitic diseases among the chinch bugs to destroy them. The effectiveness of these different methods is not entirely satisfactory and science is still laboring to find some means of counteracting another plague of chinch bugs should it break out in the great grain growing regions of the West. There is at present no absolute assurance that another chinch bug plague may not visit this country in the near future. The chief guard against any such dire visitation is found in the close watch kept upon the insects in different parts of the country. As soon as there is a slight outbreak in one section of the West, attention is called to that region, and every effort is made to destroy the eggs and larvæ of the insects before they have had the opportunity to multiply in great numbers. The passing of all these plagues is due chiefly to this eternal watchfulness kept upon the creatures and to the immediate steps taken to destroy the eggs and larvæ at an early stage. In this way no great swarms are ever permitted to get the ascendancy.

In the South the greatest insect plagues have been those which attacked the staple farm crop of that section. Cotton's worst enemy has been the cotton caterpillar or cotton worm, and the boll worm. The former caused annual losses to the cotton industry in the South of some \$15,000,000, and twice in the memory of man the damage amounted to over \$30,000,000 in a single season. The cotton caterpillar has always been with the planters in the South, and periodic visitations occur.

Plaice, *Pleuronectes platessa*, a fish well known in Northern Europe. It ranges from the coast of France to Iceland, frequenting sandy banks, sometimes met with on mud

banks. It is not in great repute as a food fish, as its flesh is soft and watery.

Plaid, goods of any quality or material of a tartan or checked pattern. Also, a garment of tartan or checked woolen cloth of various colors, worn by both sexes of the natives of Scotland, of which country it is an important part of the national costume. Plaids of a peculiar black and white check, known as shepherd's tartan, or of a plain gray, are largely worn by the rural population of Scotland, and are sometimes called mauds. The plaid is a rectangular piece of stuff. The belted plaid is plaited and bound round the waist with a leathern belt, the upper part being attached to the left shoulder.

Plain, an expanse of low-lying territory as distinguished from a table-land or plateau. Speaking broadly, the Western Hemisphere is the region of plains, and the Eastern of table-lands. Nevertheless, the former has in it what is called the Great Northern plain, extending, with the one break in the Ural Mountains, from the shores of the Atlantic nearly to Bering's Strait, and from the Arctic Ocean to the Caucasus and Altai Mountains. It extends over 190° of longitude, and about 4,500,000 square miles. It is subdivided into the German and the Sarmatian plains in Europe, and the Siberian plain and Kirghiz steppes in Asia. In this hemisphere are the Great Central and the Atlantic plains of North America, and the great South American plain, which is estimated to stand to the mountainous parts of that continent as 4 to 1. Also, a nickname for the level floor of the hall in which the first French National Convention was held in 1792. By metonymy it was applied also to the Girondist party whose seats were there.

Plain, Fort, or Fort McKean, a Revolutionary fort at the junction of the Mohawk and Osquaga creeks, N. Y.

Plainfield, a city in Union co., N. J., on the Central of New Jersey railroad; 24 miles W. of New York. It is a suburban place of residence for New York business men. It contains a young ladies' seminary, an academy for boys, public library, Muhlenberg Hospital, street railroad and electric light plants, banks, and weekly newspapers. It has manufactories of hats, clothing, machinery, printing presses, etc., and an assessed property valuation of over \$8,000,000. Pop. (1900) 15,369; (1910) 20,550.

Plain Song, *Santus planus*, the most ancient and simple form of church music, consisting of easy progressions in one of the church modes, suitable for use by priests or a congregation; it is opposed to *cantus figuratus*, or figurate song, containing more ornate progressions of a later period. When

counterpoint was introduced, it was customary to compose parts above or below a portion of ancient plain song, hence, the term plain song is often synonymous with *canto fermo*, or the fixed melody to which counterpoint is added. The term as used in these days includes roughly, ancient chants, inflections, and melodies of the church. Called also plain chant and sometimes plain singing. Also the simple, plain notes of an air without ornament or variation.

Plaintiff, one who enters or lodges a complaint in a court of law; one who commences a suit in law against another; opposed to defendant.

Plan, properly a map, representation, or delineation of a building, machine, etc., on a plane surface. More exactly, the plan of a building is a horizontal section supposed to be taken on the level of the floor through the solid walls, columns, etc., so as to show their various thicknesses and situations, the dimensions of the several spaces or rooms, the position of the doors, etc. This is also called the ground plan or orthography of the building. In the geometrical plan, the parts are represented in their natural proportions. In the perspective plan, the lines follow the rules of perspective, reducing the sizes of more distant parts. The term is also commonly extended to a map or representation of a projected or finished work on a plane surface; as, the plan of a town, of a harbor, etc.

Planard, François Antoine Eugène, a French dramatist; born in Millau, in Aveyron, Feb. 4, 1783. Besides the novel "Almedan" (1825), and some occasional verse, he wrote many comedies, as "The Marrier of Old Women" (1808); "The Family Portrait" (1809); "The Supposititious Niece" (1813); "The Lucky Meeting" (1821); and several libretti of comic operas, among them "Last Wills and Love Letters," music by Auber; "The Manikin of Bergamo," music by Fétis; "Mina," music by Ambroise Thomas. He died in Paris, Nov. 13, 1853.

Planarida, a sub-order of *Turbellaria*, flat, soft-bodied, hermaphrodite animals, of ovoid or elliptic form; their integument with vibratile cilia and cells; the former used in locomotion. They have a proboscis, and two pigment spots serving for eyes. Sections: Rhabdocœla, with the body long, round, and oval, with the intestines straight and unbranched; and Dendrocœla, with the body broad and flat, and the intestine branched or arborescent.

Planché, James Robinson, an English playwright, archæologist, and herald; born in London, Feb. 27, 1796. His first extravaganza, "Amoroso," was produced at Drury Lane Theater in 1818, and others soon followed. In 1823 he designed for Charles

Planchette

Kemble the dresses and appointments for the play of "King John," and afterward for other Shakespearian productions. In 1824 he wrote English words for Weber's "Der Freischütz," and in 1826 for "Oberon"; and in the period following 1831, when he was engaged by Madame Vestris at the Olympic, nearly 200 dramatic pieces came from his pen—the most adaptations, but a large number original dramas (*e. g.*, "Charles XII.") and extravaganzas. Of the latter five volumes were published in 1880. In 1843 he helped to found the British Archæological Association, and for many years he contributed valuable papers to the proceedings of the Society of Antiquaries. In 1854 he was made *Rouge Croix Pursuivant*, and in 1866 *Somerset Herald*; in 1872 he received a civil list pension of \$1,000 a year. He died May 29, 1880.

Planchette, a heart shaped piece of board mounted on thin supports, two of which are casters, and one a pencil which makes marks as the board is pushed under the hands of the person or persons whose fingers rest upon it. The exact cause of its motions is not clearly understood.

Plane, in joinery, a carpenter's cutting and surface smoothing tool, of which there are many varieties, called from some peculiarity of construction or purpose: the jack plane, from 12 to 17 inches long, for taking off the roughest surface of the stuff; the trying plane, used after the jack plane, length 20 to 22 inches; the long plane, used for planing a piece of stuff very straight, length 24 to 26 inches; the jointer plane, length 28 to 30 inches, used for obtaining very straight edges, the smoothing plane, 6½ to 8 inches long; also, the block plane, 12 inches long, used for finishing off work, and obtaining the greatest possible smoothness on the stuff. The above are called bench planes.

In geometry, a surface such that, if any two points be taken at pleasure and joined by a straight line, that line will lie wholly in the surface. A plane is supposed to extend indefinitely in all directions, the term is also frequently used, especially in astronomy, to denote an ideal surface supposed to cut or pass through a solid body, or in various directions; as, the plane of the ecliptic, the plane of a planet's orbit.

Plane Tree, any species of the genus *Platanus* of which five or six exist. They are tall trees with ponderous trunks, the bark of which peels off annually, leaving the surface smooth and bare. The Oriental plane tree, *P. orientalis*, an umbrageous tree, 70 to 90 feet high, has palmate leaves like those of the sycamore. It is a native of Western Asia and Cashmere. Its smooth-grained wood is used in the East for cabinet making. Mr. Honigberger says that in India its bruised leaves are applied to the

Planet

eyes in ophthalmia, and its bark, boiled in vinegar, given in diarrhœa. The Occidental or American plane tree, *P. occidentalis*, has less deeply divided and indented leaves, and no membranous bracts along the female flowers. On the banks of the Ohio and the Mississippi there are trees 10 to 16 feet in diameter. Called in the United States also, buttonwood and water beech, and sycamore, and in Canada, cotton tree. A third species, often confounded with this one, is the maple-leaved plane, *P. acerifolia*, the species sometimes with giant trunk, cultivated in some London squares. The Scotch or mock plane tree is *Acer-pseudo platanus*.

Planet, a heavenly body which, to old-world observers, seemed to wander about aimlessly in the sky, thus markedly contrasting with the orderly movements of the fixed stars. Subsequently it was discovered that the seemingly erratic bodies were as regular in their movements as the others, revolving, like the earth, around the sun, the aberrations arising from the fact that both the planets and the observers were in motion. When they are comparatively near the earth and move thence to go round the sun, they seem to go in one direction; when they return on the other side of their orbit, they appear to retrograde in the sky. Shining only with reflected light, they shine with a steady radiance in place of twinkling like the fixed stars. Planets are primary or secondary, the former revolving around the sun, the latter around the primaries. The primary planets known to the ancients were five: Mercury, Venus, Mars, Jupiter, and Saturn. Omitting asteroids, comets, and meteoric rings, eight are now known: Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Twenty-one secondary planets are known, the Moon, two satellites of Mars, five of Jupiter, eight of Saturn, four of Uranus, and one of Neptune. The existence of an intermercurial primary planet has been suspected but not proved. The planets Mercury and Venus, being nearer than the Earth to the Sun, are called inferior planets; the others, being more distant, are termed superior. Another classification is sometimes adopted, that into intra- and extra-asteroidal planets; that is, those nearer and those more remote from the sun than the asteroids. Under the first are included, Mercury, Venus, the Earth, and Mars, all of which are comparatively small, while the others, Jupiter, Saturn, Uranus, and Neptune, are the giants of the system. For instance, the Earth is 7,918 miles in diameter, and Mars 4,200, but Jupiter is 85,000. The intra-asteroidal planets complete the annual revolution in short periods, the Earth, for example, in 365.26 days, while Neptune takes to do so 60,127 days, or about 165 years. The minor planets, planetoids, or asteroids are between Mars and Jupiter.

Planetoids

Planetoids, the name given to a great group of minute planets placed together between Mars and Jupiter. Professor Titius, of Wittenberg, having drawn attention in 1772 to the fact that, with the exception of Jupiter, each planet has an orbit just about double that nearest to it on the side of the sun, Professor Bode, of Berlin, drew the natural inference that the one exception to the rule would probably be removed by the discovery of a planet less remote from the sun than Jupiter, and more distant than Mars. A society was formed in 1800 for the special purpose of exploring the zodiac with the hope of discovering the supposed planet, but its efforts were not crowned with success. On Jan. 1, 1801, a planetary body, afterward called Ceres, was found by Piazzi (who did not belong to the society) in the part of the solar system theoretically indicated; it was, however, far more diminutive in size than had been expected. Within the next six years three more asteroids (Pallas, Juno, and Vesta) were found in proximity to Ceres, and the suspicion arose that a goodly-sized planet had either been blown to pieces by internal forces of an explosive character, or splintered in a collision with some other heavenly body. Sir D. Brewster boldly affirms this in his edition of "Ferguson's Astronomy," while Sir J. Herschel at one time ridiculed the idea. It was reasoned that if such a catastrophe had taken place, many more than four fragments of the shattered planet would probably exist; but the search having been considered futile, it was abandoned in 1816. It was subsequently resumed and up to November, 1898, 426 of these small planets had been discovered, 70 by Americans. All are of minute size, and some angular in place of spherical. According to Daniel Kirkwood, an American astronomer, they would if they were taken collectively make a planet only a little larger than Mars.

The term asteroid, applied to these small bodies, is now becoming obsolete, the appellation minor planets taking its place. They are sometimes also called extra-zodiacal planets, from their orbits stretching outside the zodiac, which is not the case with those of the normal type. Authorities differ respecting some minute points in the list of asteroids. Melete, when discovered on Sept. 9, 1857, was mistaken for Daphne, an error not detected till January, 1859. Herschel, Proctor, etc., number it 56, and place the date 1857, where it offends the eye, in 1859; others, with Mr. G. F. Chambers, transfer it to 1857, which alters the numbering of all the minor planets from 47 to 56. Before it was called Melete it used to be designated Pseudo-Daphne. There are other minute differences between lists of asteroids by leading authorities.

Plantaginaceæ

Planet Wheel, the exterior revolving wheel of the "sun and planet" motion, invented by James Watt. So called from its rotation around another gear wheel, which is termed the sun gear. The axis of the planet gear is preserved concentric with the axis of the central or sun wheel by means of an arm. The planet wheel sometimes gears with an internally cogged wheel, and may be driven by the latter, rolling around inside the larger gear wheel instead of outside.

Planimeter, an instrument for ascertaining the contents of irregular plane figures; a planeometer or platometer.

Planing Machine, a machine for truing up and facing boards or the sides of timbers. When it also works the edges, it is known also as an edger; when the edges are respectively tongued and grooved, they are known as matched, are said to be matched up; when the stuff is molded or dressed to ornamental shape, the machine is known as a molding machine. Also a machine in which a metallic object dogged to a traversing table is moved against a relatively fixed cutter. In practice, the cutter is adjusted in a stock, and is usually fed automatically between strokes.

Plank, Fort, or Fort Blank, a Revolutionary fort in Montgomery co., N. Y., about 2 miles N. W. of Fort Plain.

Plants. See VEGETABLE PHYSIOLOGY.

Plantagenets, the surname of a line of English kings, who were of French origin on the paternal side—HENRY II. of England, the first of the line, having been the son of Geoffrey V., Duke of Anjou, and of Matilda, daughter of Henry I. The Duke of Anjou was so named because he usually wore a sprig of broom—in Latin *planta genista*, in French *plante genêt*—in his cap. Henry II. ascended the English throne in 1154, and his descendants reigned during 331 years, the last monarch of the line being RICHARD III., who fell at the battle of Bosworth, in 1485. In the 14th century the line became divided into two great rival factions, that of York and of Lancaster, known as the parties of the Red and White Rose.

Plantaginaceæ, or Plantagineæ, ribworts; an order of perigynous exogens, alliance Cortusales. Herbaceous plants with or without a stem. Leaves flat and ribbed or taper and fleshy. Flowers in spikes, solitary; calyx four-parted, persistent; corolla membranous, monopetalous, the limb four-parted; stamens four; ovary two, rarely four, celled; ovules solitary, twin, or indefinite; capsule membranous, dehiscing transversely. Distribution worldwide: known genera three, species 120.

Plantago

Plantago, plantain or ribgrass; the typical genus of the order *Plantaginaceæ*; herbs, with bisexual flowers; corolla with an ovate tube and a four-partite, reflexed limb; stamens four; capsule two to four celled, two, four, or many seeded, opening transversely. Mucilaginous and astringent. Known species about 48. In India several species are used for medicinal purposes.

Plantain, the *Musa paradisiaca*, a small tree closely akin to the banana, from which it differs in not having purple spots on its stem. The fruit also is larger and more angular. It is extensively cultivated throughout India, where its leaf is used for dressing blistered wounds and as a rest for the eye in ophthalmia. Powdered and dried, it is used to stop bleeding at the nose. The fruit is delicious and thoroughly wholesome. When unripe it is cooling and astringent, and very useful in diabetes. The root is anthelmintic, and the sap is given to allay thirst in cholera.

Plantain Eaters, *Musophagidæ*, a family of pie-like birds, of African distribution, arboreal habits, and vegetarian diet. The species of *Musophaga* are bluish black, the Turacous (*Turacus*) are light green with carmine wing-feathers. This occurrence of a green pigment (turacoverdin), as distinguished from a green color, is unique among birds, and the carmine pigment (turacin) is also interesting because it seems to be partially washed out during the rainy season.

Plantation, a term formerly used to designate a colony. The term was latterly applied to an estate or tract of land in the Southern States, the West Indies, etc., cultivated chiefly by negroes or other non-European laborers. In the Southern States the term planter is specially applied to a person who grows cotton, sugar, rice, or tobacco.

Plant-Hybridism, the production of offspring of plants of different varieties, species, or genera, has received much attention from naturalists, especially since the time when Charles Darwin (*q.v.*) began to make known to the world the results of his experiments in this field. As a general rule animals or plants belonging to distinct species are not able, when crossed with each other, to produce offspring. But there are many exceptions to this rule, and a hybrid (*q.v.*) is the result of such production. At first the interest attaching to hybridism, whether of plants or animals, was almost entirely of a practical nature. This was seen, for instance, in the case of horticulture, where it was long ago observed that hybrids often presented characters somewhat different from those of either parent species. Later the subject acquired a high degree of scientific interest in relation to the theory of descent, and was so thoroughly treated by Dar-

Plantin

win that he has been long regarded as the greatest authority in this department of investigation. The laws governing the production of hybrids in the vegetable kingdom are almost identical with those in the animal kingdom. Sterility may obtain between the two parent species when first crossed, or it may first assert itself in their hybrid progeny, in which case the hybrids prove more or less infertile among themselves, and also with members of either parent species. The degree of both kinds of infertility varies in the case of different species, and in that of their hybrid progeny, from absolute sterility up to complete fertility. Self-fertilizing hybrids are hermaphrodites impregnated with their own pollen. There is no fixed relation between the degree of sterility shown by the parent species when crossed and that of their hybrid progeny. In cross-fertilized plants the transfer of pollen is usually due to the agency of wind, water, insects, or birds. As practised by scientists, cross-fertilization is performed in various ways. The ordinary method of Darwin was to grow, on opposite sides of the same pot, with a partition dividing them, cross-fertilized and self-fertilized seeds of the same plant. When a seed on each side germinated at the same time he transplanted them to another pot, again placing them on opposite sides of a partition. The experiments of Darwin have been lately far surpassed by an American naturalist, Luther Burbank (*q.v.*), who has enhanced the practical value of this branch of science in most wonderful and useful ways. His creations of new species are accomplished by patient methods of cross-pollination, hybridization or the breeding together of members of different species, and the careful selection of plants best suited to his purposes.

Plantigrada, in zoölogy, a section of the Carnivora, embracing those which apply the whole or nearly the whole of the sole of the foot to the ground in progressive motion. Example, the bears, the badgers.

Plantin, Christophe, a French printer; born in St. Avertin, near Tours, in 1514, and settled as a bookbinder at Antwerp in 1549; some six years later he began to print. The books that came from his office are distinguished for their accuracy and beautiful workmanship and finish. His business prospered, and he had often 20 presses or more in active operation at once. The most noted of all his publications is the "Biblia Polyglotta" (1569-1573), which was printed under the personal superintendence of Arias Montanus, the court chaplain of Philip II. of Spain. Plantin's editions of the Bible in Latin, Hebrew, and Dutch, and editions of the Greek and Latin classics, are scarcely less celebrated. He had set up printing establishments in Leyden and Paris, and these, with that in Ant-

werp, were carried on by the husbands of his daughters. His office in Antwerp remained in the possession of the family of John Moretus, his son-in-law, till it was bought by the city in 1876 for \$240,000; out of it was created the "Musée Plantin" (1877). Plantin died in Antwerp, July 1, 1589.

Plant Lore. Apart altogether from the more or less vague and valueless symbolism, direct or indirect, understood as the language of flowers, there is an abundant store of traditionary lore associated with all kinds of trees, plants, and flowers. The study of this throws much light on many puzzling survivals in popular folklore, and Mannhardt (1831-1880) and J. G. Frazer have shown its importance for part of the problem of primitive religion. It is not infrequent among Australians and red Indians to find the totem taking the form of a plant or tree, and for these the individual shows his reverence by refusing to gather or destroy them. We find the worship of trees widely prevalent among savages everywhere, and we have ample evidence that it was an important element in the religion of all the families of the Aryan stock. Grimm thinks the oldest sanctuaries of the Germans were natural woods, and hints at a historical connection between the ancient sacred inviolate wood and the later royal forest—a ludicrous descent from the god to the game preserver.

The oak worship of the ancient Druids, the sacred fig tree of Romulus in the center of Rome, the *Ficus religiosa* of India, and the sacred groves of the Semitic and pre-Semitic races still surviving at Carthage a century after Augustine are ready examples of tree worship from sufficiently wide centers of civilization. The primitive mind of the savage readily conceives of a tree as animated by a conscious soul cognate with his own, and he may regard the tree either as its permanent outward organism or merely its characteristic dwelling place. Hence trees have their place in the doctrine of fetichism, of idolatry, and the upward development of religion. Buddhists do not include trees among sentient beings possessing mind, but recognize the existence of the genius of the tree, and Buddha himself was such as often as 43 times during his transmigrations. The reverence paid to the famous bo tree shows how fundamental a fact is tree worship, which undoubtedly formed a large part of the old indigenous religion amalgamated by the new philosophical faith.

But none the less are the sacred tree and grove to be found within the range of Semitic and Aryan influences, and the obstinate revival, even under the shadow of purer rites, of the Canaanitish Ashera wor-

ship proves how deeply they were rooted in the old religion of the land. From all sides we find evidence at once of the great antiquity and uniformity of the worship of trees, whether for the services they render to man, for their venerable antiquity, their form, for particular qualities ascribed to them as containing the seeds of fire, for their situation, as on somber and lonely mountain tops, or for their association with certain phenomena, as plagues and pestilences, or certain events in the history of the homestead. In the growth, life, decay, and death of the plant the primitive man easily sees an analogue to his own life history, and herein we may find the philosophy of the widespread rustic rites associated with marriage and with the birth of children. The custom of scattering flowers and the fruits of the field over the footsteps of a newly married pair conveys an obvious reference to the belief in the reproductive powers of vegetation and to the fundamental postulate of all sympathetic magic that any effect may be produced by imitating it. Primitive ideas of the fertilizing and fruit bearing powers of nature led easily, according to Mannhardt, to the belief that each tree or plant possesses spiritual as well as physical life, being tenanted either by semi divine spirits or by the ghosts of the dead; and a natural generalization of this notion made plants and trees collectively the abode of particular inhabitants—an example of animism developing into polytheism.

A forest god has been deduced from a mere tree soul, both alike regarded as powerful to produce rain or sunshine, to cause fruits to spring and cattle to easily bring forth their young. A still higher generalization gave a belief in a genius of plant life or forest life, or, higher still, a genius of growth or fertility in general. This universal genius of growth was symbolized by a bush or tree, brought in triumph from the forest, gaily decked, and solemnly planted near the homestead or in the village. We have thus seen both the spirit incorporate in the tree, suffering and dying with it, and the tree considered as the mere dwelling place of the god; but still further in many cases we find the tree spirit regarded as detached from the tree, and, through a confusion of his vegetable and anthropomorphic representations, clothed in human form as a man or a girl decked with flowers—the May King, Queen of the May, the Old Woman or Corn Mother of German harvest fields, the Jack in the Green of young London sweeps, and the like. The existence of those corn spirits which especially haunted and protected the waving corn we see dimly recognized in characteristic ceremonies of an English harvest home, and in

the German custom of leaving the last sheaf of rye in the field as a tribute to the Roggenwulf. The French and German custom of the Harvest May, in which a branch or tree decked with ears of corn is carried home in the last wagon from the harvest field and hung on the roof of the farmhouse till next year, is closely cognate with the *eiresione* of ancient Greece, and suggests a parallel with some of our own old harvest customs.

Sympathetic affinities between plant and animal life strongly impress the primitive imagination; we find them playing an important part in many cosmogonies, as in the Iranian account of how the first human pair grew up as a single tree, the fingers or twigs of each one folded over the other's ears, till the time came when they were separated, and infused by Ahuramazda with distinct human souls. Other mythical cosmogonic trees that need only be named are the heavenly fig tree of the Vedas, and the ash tree Yggdrasil of Norse mythology. In some places trees are informed when their owner dies, and an apology formally made to them by the woodcutter before he fells them; and every one is familiar with the custom of planting a tree at the birth of a child, and the notion of a sympathetic relation subsisting throughout life betwixt the two. The trees planted by Queen Victoria on her visit to an English town, and the trees of Liberty planted to mark a new political régime, convey unconsciously a survival of the same sympathetic symbolism. The belief that a child's rickets can be cured by passing him through a cleft ash tree still lingers obstinately in corners of England, and stories of trees giving forth human groans and exuding human blood are common in folk tales everywhere. Even so late as 1870, in Oxfordshire, a gipsy woman told how Fair Rosamond was changed into a "Hoïy Briar," which bleeds if one plucks a twig. Families, as well as individuals, have tutelary or guardian trees, and Hytén-Cavallius, for example, tells us that the three families of Linnæus (or Linné), Lindelius, and Tiliander were all called after the same tree, an ancient linden or lime which grew at Jonsboda Linder-gord. When the Lindelius family died out one of the old lime's chief boughs withered; after the death of the daughter of the great Linnæus the second main bough fittingly bore leaves no more; and when the last of the Tiliander family expired the tree's active life came to an end, though the dead trunk still exists and is highly honored.

We see then how natural is the notion of symbolizing the genius of vegetation under the form of a tree, and thus, as has been shown, we find some hint at the real philosophy underlying the joyous old world May day usages, the Maypole decked with

streamers, round which young men and maidens danced in chorus, and not less the high ceremonies attending the harvest home. Even our Christmas tree, which originally made its way into England and France principally through the influence of Prince Albert and the Duchess Helen of Orleans, is really nothing but a survival of an ancient German custom of heathen origin, and we may safely disregard the foolish theory of its being Christian because the 24th of December chanced to be consecrated to Adam and Eve. One legend relates how Adam brought from Paradise a fruit or slip from the Tree of Knowledge, from which sprang the tree from which the Cross was made—an example of a process of myth making after the fact to which we owe not a few beliefs and customs not understood. But many plants have received a kind of religious consecration from the name of some saint whose festival fell on the day on which they were gathered.

Christianity, like Buddhism, early showed a marvelous adaptability in the way in which it adopted popular rites of an earlier religion, and subtly rebaptized them as its own. Many remnants of primitive superstitions survive in the local English names of plants and flowers, chiefly in connection with the fairies, the devil, the Virgin, and the Cross, and we have a great wealth of association from one cause or other between saints and flowers, as St. Agnes with the Christmas rose, St. Joseph of Arimathea with the Glastonbury thorn, St. Patrick with the shamrock, the Virgin with the white lily, just as Thor had his oak tree, Venus her myrtle, the Indians the lotus, and the Druids the mistletoe. Again, historical personages and families are frequently associated with particular flowers—it is enough merely to name the orange lily, the red and white roses, the fleur-de-lis, the *planta genista*, and the violet. Family and clan crests frequently take this form, as the fir, holly, juniper; also national badges, as the rose, thistle, shamrock.

More curious and interesting, though obscure, are the notions of magical properties connected as persistently with some plants as medicinal properties are with others. Most prominent in European folklore are the elder, the thorn, and the rowan or mountain ash; but strange properties are still ascribed to the rosemary, vervain, St. John's wort, mandrake, asphodel, and to fern seed; and many flowers lend themselves through some obscure inherent fitness to special methods of divination. The doctrine of SIGNATURES (*q. v.*), of such importance in the history of medicine, opens up a special chapter of sympathetic magic, involving the belief that plants bore by nature marks indicating plainly for what diseases they were

medicinally useful. The trees of Paradise, of Chaldaean and other cosmogonies, the oracular oaks of Dodona, those trees of healing spiritually allegorized in the Apocalypse, the trees of Liberty and the French Revolution, and the trees round which an Indian bride and bridegroom walk hand in hand, point as unmistakably to a real sympathetic affinity between the human and the vegetable world as did the Dryads, Fauns, and Satyrs of the ancient Hellenic mythology, with their analogues our own elves and fairies of the woods, the transformation myths, the Orpheus whose lyre laid its charm on beasts and trees alike, or the Pan at the report of whose death all nature mourned aloud.

Plants, Aquatic. See AQUATIC PLANTS.

Plants, Origin of. See VEGETABLE PHYSIOLOGY

Plasencia, a town of Spain, in Estremadura, 130 miles W. by S. of Madrid and 43 N. E. of Caceres, surrounded with double walls (1197), has a fine Gothic cathedral (1498). The monastery of San Yuste, to which Charles V. retired after his abdication, lies 24 miles to the E. of Plasencia.

Plasma, the viscous material of a cell from which the new developments take place; formless, elementary matter.

Plasma, a bright to leek-green variety of chalcedony, sometimes almost emerald-green; feebly translucent; luster, somewhat oily; fracture, sub-vitreous, probably due to a small amount of opal-silica present. It is rather rare, and was much esteemed by the ancients for engraving on.

Plasscy, a battlefield on the Bhágirathi river, 96 miles N. of Calcutta. The river has now eaten away the scene of the struggle. Plassey is celebrated in the history of India for the great victory gained by Clive over Suraj ud Dowlah, subahdar of Bengal, June 23, 1757, a victory which really laid the foundation of British supremacy in India.

Plaster, calcined gypsum or sulphate of lime, used, when mixed with water, for finishing walls, for molds, ornaments, casts, luting, cement, etc. The hydrated sulphate of lime is calcined at a heat of about 300° F., and parting with 20 per cent. of water falls into a white powder. While it decrepitate it does not decompose, like limestone, but is greedily absorbent of water, and by combination therewith becomes again solid. Also a composition of lime, sand, and water, with or without hair as a bond, and used to cover walls and ceilings. In pharmacy, an unctuous compound, united either to a powder or some metallic oxide, and spread on linen, silk, or leather, for convenience of external application.

Plastering, the art of covering the surface of masonry or wood work with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit it for painting or decoration. In plastering the interior of houses a first coat is generally laid on of lime, thoroughly slacked, so as to be free from any tendency to contract moisture, and mixed with sand and cow's hair. For the purpose of receiving this coat the wall is generally first covered with laths or thin strips of wood, with narrow interstices between. The face of the first coat, which should be of considerable thickness, is troweled, or indented with cross lines by the trowel, to form a key for the finishing coats. The second coat is applied to this when it is thoroughly dried. It is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat.

Plaster of Paris, the name given to gypsum when ground and used for taking casts, etc.

Plata, Rio de la, River of Silver; a body of water which extends for more than 200 miles between the Argentine Republic and Uruguay, and is not, strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay. It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 miles. On its banks are the cities and ports of Montevideo and Buenos Ayres. Navigation is hampered in some parts of the river by shallow water and sand banks. It was discovered in 1515 by Juan Diaz de Solis, and called Dio de Solis; it owes its present name to the famous navigator Cabot.

Plate Glass, Manufacture of. Among the numerous branches of manufacture which have made Pittsburg and the valleys of the Alleghany and the Monongahela the most famous industrial center in the world, the manufacture of glass in its various forms holds a prominent place.

The latest process in this industry are as follows: The raw materials for the glass consist of sand, salt cake, soda ash, limestone, charcoal, and arsenic. These are brought to the works on cars which are run up on to a trestle that extends above a series of bins in the storage house. The va-

rious materials are dumped into their respective bins, from which they are shoveled, in the proper portions, into two-wheeled hand carts, known as "batch wagons," and wheeled to the weighing machines, where the proper proportions of each constituent are determined by weight. The material is then thoroughly mixed, and wheeled to the casting hall furnaces. Over 50 per cent. of the mixture consists of sand, the grade of sand used in the manufacture of plate glass being an almost pure silica.

The Melting Pots.—The melting of the mixture is done in large clay pots which are 44 inches in diameter and 3 feet deep. As these pots have to be exposed to a fierce heat of nearly 3,000°, the greatest care has to be taken in the selection and preparation of the clay from which they are molded. The "pot clay," as it is called, is somewhat similar to firebrick clay; but it has to undergo a most careful and thorough kneading by foot in order to give it the proper consistency and the remarkable tenacity which is one of its chief characteristics. The kneading is done in a large square vat by specially trained workmen, who tramp sideways from end to end of the vat, stamping down the clay as they go. A poorer grade of the same clay is prepared for manufacturing the furnace doors. After kneading, the clay is taken to a room above, where the pots are carefully molded by hand, the molders building up the circular wall of the pot by working in a handful of the clay at a time, each lump being thoroughly kneaded into the piece as it grows into shape. The walls of the pot are 4½ inches thick. After the pot is completed it is left to dry by natural heat. The furnaces are arranged at the base of huge chimneys. The bottom of the furnace is level with the floor of the furnace room, and each furnace has 10 vertically sliding doors, five on each side. The whole structure is built of first-class firebrick, the sliding doors consisting of large molded slabs of clay. In this particular works there are five of these furnaces, three of which are in continual operation, the others being held in reserve.

Melting and Casting.—After the mixture of sand, salt cake, soda ash, etc., has been placed in the melting pot, it is picked up by a mammoth pair of tongs, brought by an overhead traveling crane to the furnace and placed on the floor of the same. After the doors are closed and sealed, the producer gas is turned on, and in 15 hours the mixture is melted ready for pouring. The door is then lifted and a large, wrought iron, balanced, pair of tongs is swung into the furnace by a traveling crane. The pot is withdrawn and brought to the casting table. The casting table is a carefully trued surface of cast iron, and travels on

a track laid between two lines or annealing furnaces. Upon one end of the table is a hollow cast iron roller 18 inches in diameter, which extends entirely across the table. Down each edge of the table is laid a strip of iron, half an inch in thickness, upon which the roller travels. Around each end of the roller is wound a chain, which is carried to the opposite end of the table, to the drum of a hand winch. For convenience of operation the melting furnaces and the annealing furnaces are laid out at right angles to each other, intersecting at their common center. An overhead electrical crane carries the pot of molten glass up to the line of the annealing furnaces where it is set down and picked up by a small jib locomotive crane, which travels on a track that runs the full length of the annealing furnaces. By means of this crane it is carried to the casting table, where the contents of the pot are poured out immediately in front of the roller already referred to. The roller is then drawn forward, and as it is raised above the table by just half an inch, or the thickness of the side strips upon which it travels, it follows that the molten glass is rolled out in a sheet of just that thickness. By the time it has been rolled out the glass has cooled sufficiently to be moved, and the door of the annealing furnace is raised and the sheet pushed forward into the furnace.

Annealing.—The object of annealing is exactly the same as that of annealing in the manufacture of steel; namely, to take out any cooling strains which may have been set up in casting, and to allow the molecules to rearrange themselves and take up a position which will leave the plate absolutely free from initial strains. The annealing furnace is heated to the proper temperature, about a cherry red, and as soon as the plate has been introduced the gas is shut off and the plate is left in the furnace for from four to five days.

Grinding.—The glass plate as taken from the annealing furnace is half an inch in thickness, and it now has to undergo the grinding and polishing processes, during which it will be reduced to the finished thickness of a quarter of an inch, an eighth of an inch being lost on each side of the plate. The rough grinding is done between series of grinding tables arranged in groups of three, each group consisting of a lower and two upper tables. The lower table is a large cast iron rotating disk which has been faced and carefully trued up. The plate is laid on this and secured to it with plaster of Paris. Bearing upon the glass plate are two circular runners, one of which is 12 feet and the other 14 feet in diameter. The two runners are journaled in a trussed frame which extends across the top of the machine, and they are driven by means of miter gears and shafting. The

bottom face of the runners is shod with a number of parallel, cast iron, serrated bars, which are spaced about three inches apart. The grinding is started at a slow speed, the runners moving at the rate of about two revolutions to the minute. As it proceeds, the speed is increased till it reaches a speed of 30 revolutions to the minute. Sharp river sand and water are fed to the plate, and as not merely the runners, but the table below are constantly rotating, the grinding is perfectly even over the whole surface of the glass, and a remarkably true surface is secured. When about an eighth of an inch has been taken off, the plate is turned over and the rough grinding is repeated on the opposite side. As the sand and water flows from the grinders it is carried to a series of pits and boxes where it is graded into four grades.

Polishing.—The plate as it comes from the rough grinders is somewhat opaque and its surface has a milky appearance. It is now necessary, before the glass is finally ready, to give it a finish polishing, which is done in a separate room upon a large number of low tables. Down the full length of each table extends a stout cast iron girder, to which is attached at intervals of about 20 inches a series of transverse wrought iron bars. Through the end of each of these bars extend the vertical shafts of a series of felt-covered polishing disks. The pressure upon these disks is regulated by means of cup-shaped weights which are placed on their vertical spindles. The polishers are fed with a rouge which is somewhat similar to the polishing rouge of jewelers, but is of coarser consistency. The longitudinal girders before referred to are connected to the crank arm of a series of spur wheels driven, in each case, by a 75 horse power engine, and by this means an oscillatory movement is given to the whole series of polishers. It takes about 12 hours, 6 hours to each side, to give the proper polish to a plate of glass. When the polishing is completed, the plates are stamped and taken to the salesroom, where they are carefully examined by experts both for finish and quality. Any faults, such as small bubbles, unmelted portions of the original mixture that may have come through the process, scratches, etc., are cut out, or, if it is necessary, the whole plate condemned. The total capacity of plate glass by the whole 10 establishments of the Pittsburg Plate Glass Company is 22,000,000 square feet per annum.

Plating, the act, art, or process of covering articles with a thin coating of metal; especially the art of covering baser metals with a thin coating of gold or silver. It is effected either by a mechanical process, the gold or silver being attached to the baser metal by heat, and then rolled out by pres-

sure, or by chemical means. See ELECTRO-PLATING.

Platinum, in chemistry, Symbol, Pt.; at. wt., 194.3; sp. gr.=21.6, a tetrad metallic element discovered first in the United States; and still largely produced there; also found in the Ural chain, and in copper ore from the Alps. The ore is treated with nitromuriatic acid, which dissolves platinum and palladium, the solution is then treated with potassic chloride, yielding the double salt of platinum and potassium—the palladium being left in solution. By igniting with carbonate of potash, the platinum is reduced to the metallic state. It still contains traces of iridium, which gives it greater hardness and tenacity. Pure forged platinum takes a high luster, is nearly as white as silver, and very ductile and malleable. It resists the strongest heat of the forge fire, but can be fused by the electric current; is the heaviest known substance excepting osmium and iridium, is unalterable in the air, dissolves slowly in nitromuriatic acid, but is not attacked by any single acid. Its properties render it extremely useful to the chemist for the construction of crucibles, evaporating dishes, and stills used in the concentration of oil of vitriol.

Plato, a Greek philosopher; born in Athens, or in Ægina, in May, 429 B. C., the year in which Pericles died. He was son of Ariston and Perictione, who boasted of their descent from Cadmus and Solon, and he was named Aristocles. The name Plato was afterward applied to him in allusion to his broad brow, broad chest, or fluent speech. Endowed with a highly imaginative and emotional nature, he early began to write poems, but at the same time studied philosophy, and at the age of 20 became the disciple of Socrates.

He burnt his poems, remained devotedly attached to Socrates for 10 years, attended him on his trial, and was one of the few who listened to the final conversation on the immortality of the soul. After the death of Socrates, he went to Megara, to hear Euclid; thence to Cyrene, and perhaps to Egypt and S. Italy. On his return he began to teach at Athens, in the plane tree grove of the Academia; he taught gratuitously, and had a



PLATO.

Plato

great number of disciples, many of whom became eminent teachers. Among them was Aristotle, distinguished as the "Mind of the School," and perhaps Demosthenes. Women are said to have attended. In his 40th year, Plato visited Sicily, but he offended the tyrant Dionysius by the political opinions he uttered, and only escaped death through the influence of his friend, Dion. Two later visits to the court of the younger Dionysius were the only interruptions to his calm life as a teacher and writer at Athens.

Plato never married, took no active part in public affairs, lived absorbed in the pursuit of truth, and was so marked by gravity and melancholy, that the saying became common, "as sad as Plato." His works have come down to us complete, and are chiefly in the form of dialogues—a form of literature in which he is unrivalled. They are singular in their union of the philosophic and poetic spirit—the depth of the philosopher and the rigorous exactitude of the logician with the highest splendor of imagination of the poet. In range of speculation, the dialogues of Plato are unparalleled. "Out of Plato," says Emerson, "come all things that are still written and debated among men of thought." And, again, "Plato is philosophy, and philosophy Plato." Attempts have been made to classify the dialogues, but without useful result; and attempts to construct a formal system from them have utterly failed. Plato did not aim at a system; nor did he even aim so much at teaching truths, as at imparting and illustrating the method by which each should seek truth for himself. We owe to him the threefold division of philosophy into dialectics, physics, and ethics; the first sketch of the laws of thought; the doctrine of "ideas," as the eternal archetypes of all visible things; and the first attempt toward a demonstration of the immortality of the soul. And he proclaims the highest and purest doctrines of morality with clearness, courage, and unhesitating authority.

It is difficult to say what idea Plato had of the Deity. It seems, however, that his idea of the good and Him were identical; but whether he regarded Him as a personal being it is impossible to say. Plato distinguishes two components of the soul—the divine or rational, that which partakes of a divine principle, and participates in the knowledge of the eternal; and the mortal or irrational, that which participates in the motions and changes of the body, and is perishable. The two are united by an intermediate link, which he calls *thumos*, or spirit. He believes in future retribution; exonerates God from responsibility for sin and suffering, and sets forth in elaborate myths the blessedness of the virtuous and

Platonic Year

the punishments of the vicious. In ethics, the grand idea is the good in its various forms of development. He adopted, as a writer, the method of his great master, who forms also the central figure of the dialogues; and whose opinions and biography are so closely interwoven with them, that we cannot tell whether the light that shines on us comes from this or that side of the twin star, Socrates and Plato. His birthday was long observed as a festival. There is an admirable German translation of Plato by Schleiermacher, not complete, however; a complete French one by Cousin; and English translations of some of the dialogues by Sydenham; of the whole by Taylor, and of a few by Whewell. Gæthe's work, entitled, "Plato and the other Companions of Socrates" (1865) is one of the most important contributions ever made to the study of Greek philosophy. He died in the act of writing, it is said, in May, 347 B. C.

Platoff, Matvei Ivanovich, Count, a Russian general; born in Azov, Russia, Aug. 17, 1757. He served in the Turkish campaign of 1770–1771, and in subsequent wars showed such capacity and courage that he was named by Alexander I. in 1801 Hetman of the Cossacks of the Don. As such he took part in the campaigns against the French, 1805–1807, and, after the enemy had evacuated Moscow, hung on their rear with pitiless pertinacity, wearing them out by incessant attacks, cutting off straggling parties, and capturing their convoys of provisions. He defeated Lefebvre at Altenburg, May 28, 1813. After the French disaster at Leipsic he harassed their retreat on French soil, gained a victory at Laon, and made his name memorable by the devastations of his hordes of semi-savages. He was enthusiastically welcomed, and presented with a sword of honor on the occasion of his visit to London in company with Blücher. The czar gave him the title of count in 1812. After the war he retired to his own country, and died near Tcherkask, Jan. 15, 1818.

Platonic Love, an affection subsisting between two persons of different sex, which is presumed to be unaccompanied by any sensuous emotions, and to be based on moral or intellectual affinities. The expression has originated in the view of Plato, who held that the common sexual love of the race, harassed and afflicted with fleshly longings, is only a subordinate form of that perfect and ideal love of truth which the soul should cultivate.

Platonic Philosophy, the most popular of all systems of philosophy. Plato's dialogues have been termed "Philosophy backed by example."

Platonic Year, the period of time which the equinoxes take to finish their revolution, at the end of which the stars and constella-

tions have the same place with regard to the equinoxes that they had at first. Tycho Brahe says that this year or period requires 25,816 common years to complete it; Ricciolus computes it at 25,920; and Cassini at 24,800; at the end of which time some imagined that there would be a total and natural renovation of the whole creation.

Platt, Thomas Collier, an American legislator; born in Owego, N. Y., July 15, 1833; prepared for college at Owego Academy; was a member of the class of 1853 of Yale College, but was compelled to give up the course in that institution on account of ill health; received the honorary degree of M. A. from that college in 1876; entered mercantile life soon after leaving school; was president of the Tioga National bank at its organization; became largely interested in the lumbering business in Michigan; was county clerk of the county of Tioga in 1859, 1860 and 1861; was elected to the 43d and 44th Congresses; was elected United States Senator Jan. 18, 1881, and resigned that office May 16 of the same year, with Roscoe Conkling, both Senators being offended because President Garfield made New York appointments without consulting them; was chosen secretary and director of the United States Express Co. in 1879, and in 1880 was elected president of the company; was member and president of the board of quarantine commissioners of New York from 1880 till 1888; was delegate to the National Republican conventions of 1876, 1880, 1884, 1888, 1892 and 1896; was president of the Southern Central railroad; was a member of the National Republican committee; and was elected United States Senator in 1896. He died March 6, 1910.

Platt-Deutsch. See LOW GERMAN.

Platte (plät), a river in the United States, which rises in the Rocky Mountains by two branches, called respectively the North and South Forks of the Platte. The united stream falls into the Missouri after a course of about 1,600 miles. It is from 1 mile to 3 miles broad, shallow, encumbered with islands, has a rapid current, and therefore not navigable.

Plattsburg, a town and county-seat of Clinton co., N. Y.; at the mouth of the Saranac river, which here enters Cumberland Bay, a part of Lake Champlain, and on the New York and Canada, the Delaware and Hudson, and the Chateaugay railroads; about 155 miles N. of Albany. Here are electric lights, public library, court house and jail, barracks for United States soldiers, custom house, Home for Aged Ladies, Home for the Friendless, Plattsburg Academy, a State Normal school, National banks, and a number of daily and weekly newspapers. The town has a large harbor, and ships lumber, grain, and other commodities. It has manufactures of shirts, wood

pulp, sewing machines, etc., and an assessed property valuation of over \$1,500,000. On Oct. 11, 1776, one of the earliest naval actions of the Revolutionary War took place here, Benedict Arnold commanding the American forces. On Sept. 11, 1814, Commodore McDonough gained a remarkable victory over the British fleet in Cumberland Bay. About the same time an American army under General Macomb repulsed a superior land force which, under General Prevost, had attacked the town. Pop. (1900) 8,434; (1910) 11,138.

Platyelmia, "flat worms," a division of the class Scolecida. They are represented by the tape worm, flukes, etc.

Platypterygidæ. See MOTH.

Plauen, one of the most important manufacturing towns of Saxony; on the Elster, 78 miles S. of Leipsic. Its chief industries are the manufacture of cotton goods, muslin, cambric, jaconet, and embroidered fabrics, with in a secondary degree cigars, paper, machinery. Pop. 55,191.

Plautus, T. Maccius, a Roman comic poet; born in Umbria, probably about 255 B. C. He spent the greater part of his life at Rome, where at one time he is said to have been reduced to the necessity of grinding corn with a handmill for a baker. He began to write plays about 220, and gained immense popularity with his countrymen by his numerous comedies, based, many of them, on Greek models, but made his own by a bold treatment and clever adaptation of them to Roman audiences. Twenty of his comedies are still extant out of the 21 pronounced genuine by Varro. One hundred and thirty were current under his name. His plays were still acted in the reign of Domitian, and some of them have been imitated by modern dramatists. There are several English translations of Plautus's works. He died 184 B. C.

Playfair, John, a Scotch natural philosopher; born in Forfarshire, Scotland, March 10, 1748; entered the University of St. Andrews at 14, where he soon displayed special talent for mathematics and natural philosophy. Having entered the Church he held a living for some years. In 1785 he was chosen assistant professor of mathematics in the University of Edinburgh. In 1802 appeared his "Illustrations of the Huttonian Theory of the Earth," and in the following year a biographical account of Dr. James Hutton. In 1805 he obtained the chair of natural philosophy in Edinburgh University. The Royal Society of London elected him a member in 1807. He paid a visit to the Continent in 1815, and spent some 17 months in France, Switzerland, and Italy. He published "Elements of Euclid" and "Outlines of Natural Philosophy," and contributed many valuable papers to the Transactions of the Royal Societies of Edin-

Playfair

burgh, and London, and to the "Edinburgh Review." His writings are models of composition and argument. He died in Edinburgh, July 19, 1819.

Playfair, Sir Lyon, an English scientist; son of Dr. G. Playfair, inspector-general of hospitals in Bengal; born in Meerut, Bengal, May 21, 1819; educated at St. Andrews and Edinburgh Universities. He studied chemistry under Graham in Glasgow and London, and under Liebig at Giessen. His able reports on the sanitary condition of the large towns of Great Britain, and his valuable services as special commissioner at the London Exhibition of 1851, first brought him prominently before the public. He became connected with the science and art department at its establishment in 1853, inspector-general of government museums and schools of science in 1856, and was Professor of Chemistry at Edinburgh University 1858-1869. From 1868-1885 he represented Edinburgh and St. Andrews Universities in the House of Commons, and afterward the S. division of Leeds. He held several appointments under Liberal governments, including that of postmaster-general 1873-1874, and was created a K. C. B. in 1883. Besides his scientific memoirs he published numerous important papers on political, social, and educational subjects. Most of these economical essays were collected and published under the title "Subjects of Social Welfare." He was also an LL.D. of Edinburgh (1869), F. R. S., member of many learned societies, and possessed several foreign orders. He died May 29, 1898.

Playground of Europe, Switzerland.

Plays, Censor of, a person whose permission is necessary for the production of plays. A relic of the censorship of the press survives in Great Britain in the licensing of plays. By an Act of 1843 no plays may be acted for hire till they have been submitted to the Lord Chamberlain, who may refuse to license them in whole or in parts; the official who reads them for this purpose being the "examiner of stage plays." A penalty of \$150 attaches to the offense of acting an unlicensed or prohibited play; and the theater in which it is represented forfeits its license. In the United States there is no general censor, but local authorities have power to forbid the representation of plays which they consider to be hurtful to morality.

Plea, in English law, that which is pleaded or alleged by a party to an action in support of his demand; in a more restricted sense the answer of the defendant in a cause to the plaintiff's declaration and demand. Pleas are two sorts: dilatory pleas, and pleas to the action. Pleas to the action are such as dispute the very cause of suit.

Plectognathi

Pleading, the act of advocating a cause in a court of law. In the plural, the written statements of parties in a suit at law, containing the declaration and claim of the plaintiff, or the answer or defense of the defendant. Pleadings consist of the declaration, the plea, the replication, the rejoinder, the sur-rejoinder, the rebutter, the sur-rebutter, etc., which are successively filed. Pleadings were formerly made by word of mouth in court.

Pleasanton, Alfred, an American military officer; born in Washington, D. C., June 7, 1824; he was graduated at the United States Military Academy and commissioned a brevet 2nd lieutenant in 1844; served through the Mexican War, the Sioux campaign in 1856, and the Civil War. In the battle of Gettysburg he was in command of the cavalry of the Army of the Potomac; in 1864 drove the Confederates under General Price from Missouri. He was promoted Major-General of volunteers in 1863; promoted major, U. S. A., in 1888; and was retired Oct. 23, following. During his military career he took part in 105 battles, and in the Civil War was once offered the command of the Army of the Potomac. He died in Washington, D. C., Feb. 17, 1897.

Plebeians, or Plebs, in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and which were crowned with complete success when (286 B. C.) the Lex Hortensia gave the *plebiscita*, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

Plebiscitum, in Roman antiquity, a law passed by the people assembled in the Comitia Tributa. They were originally binding on the plebeians, but their effect was afterward extended to the whole people.

Plectognathi, an order of fishes founded by Müller, and by him divided into three families: *Balistini*, *Ostraciones*, and *Gymnodontes*. As revised by Dr. Günther, the order contains two families: *Sclerodermi* and *Gymnodontes*. They are teleosteous fishes, with rough scales, or with ossifications of the cutis in the form of scutes or spines; skin sometimes naked. Skeleton incompletely ossified, with few vertebræ. Air bladder without pneumatic duct.

Plectrum

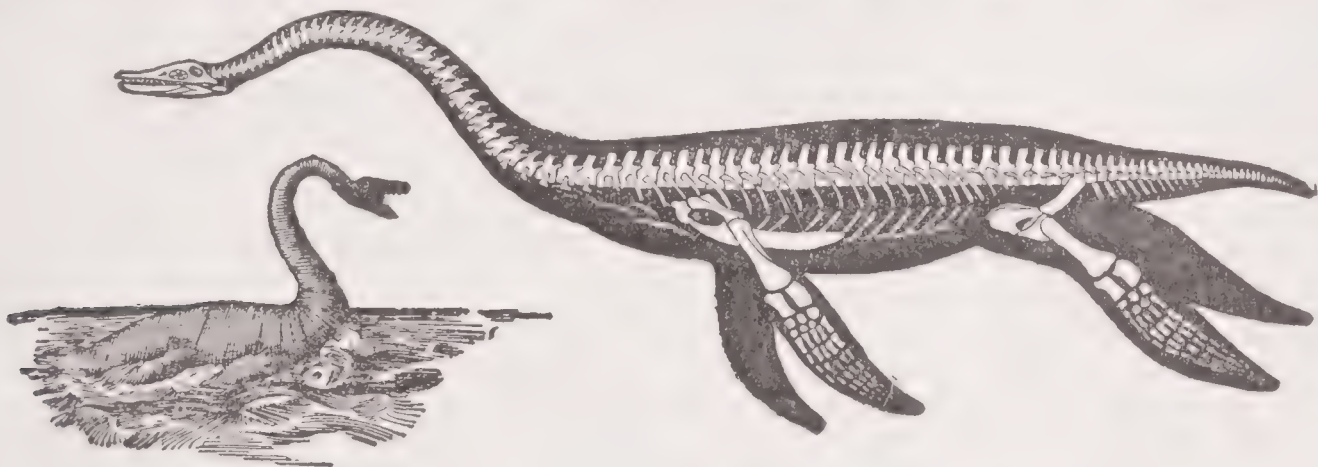
Plectrum, a little staff made of ivory, horn, quill, or metal, with which (having it in his right hand) the player on a lyra or cithara set the strings in vibration. Plectra are used by performers on the mandolin and zither.

Pledge, the transfer of a chattel from a debtor to a creditor as a security of a debt, or that which is pledged or pawned as security for the repayment of money borrowed, or for the performance of some obligation or engagement; a pawn. Pledges are generally goods and chattels, but anything valuable of a personal nature, as money, negotiable instruments, etc., may be given in pledge. A living pledge (*vadium vivum*) is one which produces an income, interest, or profit by being used, and which is retained by the pledge till he shall have

Plesiosaurus

extreme tints visible along two axes (dichroic crystals—*e. g.*, iolite or *sapphire d'eau*, and some specimens of mica).

Pleistocene, a term proposed in 1839 by Lyell as an abbreviation for Newer Pliocene; but Edward Forbes, in adopting it, applied it to the next more modern series of beds, called by Lyell Post-Tertiary. Confusion thus arising, its author withdrew the word, but in the "Student's Elements of Geology," he readopted it in the sense of Post-Pliocene. He considers it the older of two divisions of the Post-Tertiary or Quaternary period, and as distinguished from the newer or recent one by having all its shells of living forms, while a part, and often a considerable one, of the mammalia are of living species. Under it are placed the Reindeer period and the Palæolithic age



In life.

Skeleton.

PLESIOSAURUS.

satisfied his claim out of such income, profit, or interest; a dead pledge (*vadium mortuum*) is a mortgage.

Pleiades, or **Pleiads**, a group of stars in the constellation Taurus, the Bull. The stars are so close together that it is a difficult to say how many are seen by the naked eye. "They are called 'seven,'" says Higenus, "but no one can see more than six"; and six seems to be the number generally visible, though there are many more in the cluster. There is a supposition that some one of the stars once visible has disappeared, or changed its magnitude. According to mythology, the Pleiades were the seven daughters of Atlas, who, being pursued by Orion, were changed by Jupiter into doves. They were afterward translated to the heavens, where they formed the assemblage of the Seven Stars in the neck of Taurus.

Pleiochromism. In some crystals, such as some specimens of topaz, three distinct colors may be observed on looking through them along three rectangular axes. In intermediate directions intermediate tints may be observed; and this property is that of pleiochromism or polychromism. In some other cases a similar range of intermediate tints may be observed, lying between two

generally, the Brick-earth, the Fluvatile Loam or Loess, the High Plateaux Gravel or Loess, the Cavern and the Glacial Drift deposits. The climate was colder than now, the summers hot and short, the winters long and severe. Fossil mammals, *Elephas Primigenius*, *E. antiquus*, *Rhinoceros tichorhinus*, the genus *Machairodus*, *Hyaena spelæa*, *Ursus spelæus*, *Cervus megaceros*, *Bison priscus*, etc.

Plenipotentiary, one who is invested with full and absolute powers to transact any business; specifically, an ambassador or envoy accredited to a foreign court, with full powers to negotiate a treaty or to transact other business. Plenipotentiaries are not in all cases accredited to any particular court. Meetings of plenipotentiaries for negotiating treaties, settling terms of peace, etc., are usually held in some neutral town, so that their deliberations may be free from influence or pressure on the part of any particular power.

Pleonasm, redundancy of language in speaking or writing; the use in speaking or writing of more words than are necessary to express an idea.

Plesiosaurus, the typical group of the order *Plesiosauria*. The skin was naked, the head comparatively small, neck dispro-

Plethora

portionately long, and the tail short. Teeth conical and pointed, with longitudinal striations, each sunk in an independent socket. The paddles consist only of the five digits, without marginal ossicles. It was certainly aquatic; most probably marine, though it may have occasionally visited the shore. Its organization would fit it for swimming on or near the surface, and the length and flexibility of its neck would be eminently serviceable in capturing its prey. Plesiosaurus is only known with certainty to have existed from the time of the Lower Lias to the Chalk; and it is especially characteristic of the Lias.

Plethora, an overfullness mentally, intellectually, or otherwise; superabundance; as, a plethora of wit. Among the Greek and Roman medical writers the word was used for what they deemed redundancy of blood; now it means that condition of the body in which the quantity and nutritive qualities of the blood exceed the normal standard.

Plethysmograph, an apparatus invented by Prof. Angelo Mosso, of the University of Turin, a leading scientist of Italy. By the aid of this and another delicately adjusted instrument called a "balance," it is possible to detect and register an idea or emotion of the brain. With his subject lying on the "balance," or sitting with the plethysmograph attached to his arm, absolutely motionless, speechless, and with eyes closed, Mosso professed to be able to tell, merely by closely observing his apparatus, whether the man was awake or asleep, whether any emotions outside of the ordinary were disturbing him, and whether his brain was active or sluggish. The advent of dreams in a sleeping man can be noticed and the difference in mental effort between that of reading Italian, an easy task, and reading unprepared a passage of Homer.

These variations and changes in mental effort that can be discovered so precisely, are all indicated by the movement of the blood in the brain and away from it, and the more mental effort, the more blood is required in the brain. The emotions, all thoughts and ideas, seem to be graded in this way that they need differing quantities of blood. Whatever is required the brain draws promptly from other parts of the body. Mosso soon found that what was needed was simply sufficiently delicate instruments to indicate these changes in the movements of the blood. His first experiments were with the pulse, which he quickly discovered altered in volume according to the thoughts a man had. To measure the pulse's variations he devised the plethysmograph.

Pleura

His most astonishing discoveries, however, have been effected with the "balance," which shows with absolute certainty the perpetual changes of locality that the blood undergoes. By this balance, and the plethysmograph applied to the pulse, it has become possible for Professor Mosso to distinguish without other aid between the thinking man and one who is absent-minded; between the man afraid and the man who is calm; between the man warm and the man cold; between the man who is tired and the one rested and full of intellectual activity, and between a man who has eaten and one who is hungry.

Stripped of all technicalities the plethysmograph is simply a perfect instrument for measuring to the extremest fraction of an inch, the volume of the hand or wrist, or its precise size under different conditions. It would hardly be imagined that the hand and wrist would vary sufficiently in size under the movements of the blood through the circulatory system on which to build up any facts of the power of thought, but that they do is well proved.

The plethysmograph is a long glass tube into which the arm is inserted nearly up to the elbow. Closed at the finger end like a bottle, the other end after all the water possible is poured in, is sealed up with putty or made water and air-tight in some manner. Communicating with this tube is another tube, this second one very slender and standing upright. It is open to the air and the water with which the large tube is filled, under ordinary conditions, overflows the big tube a little and rises up some distance in the smaller one.

Now, if under the influence of some thought, idea or emotion the blood vessels of the hand and wrist contract (the blood flowing to the brain in larger quantity) and the hand becomes smaller there will be room for more water in the large tube and the water level in the small tube will fall. If, on the other hand, the blood flows back from the brain into the hand and wrist, the blood vessels will increase in size, even ever so slightly, and the water level in the small tube will rise, sufficiently at least to mark the change.

This is what takes place with the plethysmograph, unerringly, and it has been found by experiments that this delicate instrument will indicate with certainty every change of thought, and every increase and decrease of the quantity of mental activity the brain is undergoing at the moment. Even if the subject is asleep changes will be registered in the most surprising manner.

Pleura, in anatomy, plural, serous membranes forming two shut sacs, each possessed of a visceral and a parietal portion.

The former (*p. pulmonalis*) covers the lungs, and the latter (*p. costalis*) the ribs, the intercostal spaces, etc. The term is used of the air-breathing vertebrates in the same sense as above. In the singular form it is applied to the odontophore of the mollusca.

Pleurisy, inflammation of the pleura, going on to exudation, fluid effusion, absorption, and adhesion. A stitch in the side is complained of, the breathing becomes hurried and shallow, and, as the sero-fibrinous deposit becomes greater, intense dyspnoea sets in, with a short, dry, hacking cough. Pus occasionally forms in severe cases, leading to dangerous complications, for which aspiration may be required. Old adhesions also add to the danger, as well as lung consolidations. Mechanical fixing of the structures affected is an important element in the successful treatment of pleurisy, strapping with adherent plaster, opium to relieve pain, etc., blisters, diuretics, hot vapor baths, and good nourishment are also useful means, with quinine and cod liver oil in the convalescent stages, to promote recovery.

Pleuronectidæ, flat fishes; the only family of the *Pleuronectoidei*. The body is strongly compressed, high, and flat; air bladder absent; dorsal and anal abnormally long, without division. The larvæ are symmetrical, with an eye on each side the head, and they swim vertically like other fishes. The adult fish live on the bottom, and swim horizontally with an undulatory motion. The under, or "blind," side is colorless, and both eyes are on the colored or upper side, though it has not been satisfactorily ascertained how this transference is effected. They are carnivorous, and are universally distributed, are most numerous toward the equator, though the largest are found in the temperate zones. Some enter fresh water freely and others have been acclimatized in lakes and rivers.

Pleuro=pneumonia, pneumonia with bronchitis, the former constituting the chief disease.

Plevna, a town of Bulgaria, 19 miles S. of the Danube and 85 N. E. of Sophia. Here in 1877 Osman Pasha, the Turkish general, after defeating the Russians in several engagements, entrenched himself against their reinforced and superior numbers early in September, and repulsed their endeavors to take the place by storm; but, after making an unsuccessful attempt to cut his way through the investing Russian army, he was compelled, provisions and ammunition running short, to capitulate (Dec. 10) with 42,000 men and 77 guns. The siege cost the Russians 55,000 men, the Rumanians 10,000, and the Turks 30,000.

Pleyel, Ignaz Joseph, a German composer; born in Ruppertsthal, near Vienna, June 1, 1757; studied under Haydn and in Italy, and in 1783 was made Kapellmeister of Strasburg Cathedral. In 1791 he visited London, and he harmonized many of the melodies for Thomson's "Collection of Scottish Songs." At Strasburg, during the French Revolution, he barely escaped with his life as a royalist. In 1795 he opened a large music shop in Paris, and in 1807 joined thereto a pianoforte manufactory. His compositions consisted of quartets, concertos, and sonatas. He died in Paris, Nov. 14, 1831.

Plica Polonica, Polish ringworm; a disease characterized at first by tenderness and inflammation of the scalp, after which the hairs become swollen, their follicles secreting a large quantity of viscid reddish-colored fluid, which glues them into tufts or masses. Finally, two fungals, *Trichophyton tonsurans* and *T. sporuloides*, appear, and there is a disgusting odor. The disease is probably caused chiefly by filth. It is endemic in Poland, Russia, and Tartary. Called also *Trichinosis plica*.

Plimsoll, Samuel, "the sailor's friend," an English legislator; born in Bristol, England, Feb. 10, 1824. In his 17th year he became clerk in a Sheffield brewery, and rose to a position of trust in the firm. In 1854 he started business on his own account, in the coal trade in London. Shortly afterward he began to interest himself in the sailors of the mercantile marine, and the dangers to which they were exposed. He accumulated a mass of facts proving that the gravest evils resulted from the wilful employment of unseaworthy ships, from overloading them, and undermanning them, from bad stowage, and from over insurance; unscrupulous owners insured rotten or "coffin" ships at a value greatly exceeding their real value, and sent them to sea, hoping they would founder, by which means they would make bigger profits than they could make by legitimate carrying of merchandise. Failing to induce Parliament to take legislative steps to put an end to these evils, Mr. Plimsoll himself entered Parliament, for Derby, in 1868; but it was not till he had published "Our Seamen" (1873) and had made an appeal to the general public that he succeeded in getting passed the Merchant Shipping Act in 1876, to supersede temporary measures passed during three preceding sessions. By this act the Board of Trade was empowered to detain, either for survey or permanently, any vessel deemed unsafe, either on account of defective hull, machinery, or equipments, or improper loading, or overloading; a penalty not exceeding \$1,500 was incurred by any owner who should ship a cargo of grain in bulk exceeding two-thirds of the entire

Plinth

cargo, grain in bulk being especially liable to shift on the voyage; the amount of timber that might be carried as deck cargo was defined, and enforced by penalties; finally every owner was ordered to mark (often called the "Plimsoll Mark") on the sides of his ships, amidships, a circular disk, 12 inches in diameter, with a horizontal line 18 inches long drawn through its center, this line and the center of the disk to mark the maximum load line—*i. e.* the line down to which the vessel might be loaded, in salt water. Failure to comply with this last regulation exposed the owner to a fine not exceeding \$500 for each offense. In 1890 this act was amended, the fixing of the load line being taken out of the owner's discretion and made a duty of the Board of Trade. Mr. Plimsoll retired from parliamentary life in 1880. But he did not slacken his efforts to make the sailors' calling safer: in 1890 he published a work on "Cattleships," exposing the cruelties and great dangers connected with the shipping of live cattle across the ocean to British ports. He died June 3, 1898.

Plinth, a square member forming the lower division of the base of a column, etc., also the plain projecting face at the bottom of a wall, immediately above the ground. In Gothic architecture the plinth is occasionally divided into two stages, the tops of which are either splayed or finished with a hollow molding, or are covered by the base moldings. The square footing below the bases of Ionic and Corinthian columns. In Grecian architecture plinths do not appear to have been employed, the bases of the columns resting upon the upper step of the building.

Pliny, the Elder (Caius Plinius Secundus), one of the most celebrated writers of ancient Rome; born in Verona or Como A. D.



PLINY, THE ELDER.

commanded, on the 24th of August, A. D., 79, his sister desired him to observe a remarkable cloud that had just appeared.

23; served in the army of Germany, afterward became an advocate, and was ultimately procurator in Spain. As an inquirer into the works of nature he was indefatigable, and he lost his life in a last attempt to gratify his thirst for knowledge. Being at Misenum with a fleet, which he

Pliny

Pliny discovering that it proceeded from Mount Vesuvius, ordered his galleys to sea, to assist the inhabitants on the coast, while he himself steered as near as possible to the foot of the mountain, which now sent forth vast quantities of burning rock and lava. Pliny and his companions landed at Stabiæ, but were soon obliged to leave the town for the fields, where the danger, however, was equally great, from the shower of fire which fell on them. In this state they made the best of their way to the shore, but Pliny, who was very corpulent, fell down dead, suffocated probably by the noxious vapors. The eruption which caused his death was that in which the cities of Herculaneum and Pompeii were destroyed, in the first year of the Emperor Titus. He wrote several works, which have perished, but his name and fame are preserved by his great work entitled "Natural History," in 37 books, one of the most precious monuments of antiquity extant. Its contents do not answer to its title, but are immensely various in character. It is a laborious compilation, from almost innumerable sources, of facts, observations, and statements on almost all branches of natural science, on the fine arts, on inventions, and other subjects. Unfortunately, Pliny did not observe for himself with the eye of a naturalist, nor make selections of his materials with the judgment of a critic, nor dispose them in any scientific order. It has been translated into most European languages, and even into Arabic, and has been republished a very great number of times.

Pliny, the Younger (Caius Plinius Cæcilius Secundus), nephew of the preceding; born in Como A. D. 62. He studied under

Quintilian, and in his 18th year began to plead in the forum. Soon after this he went as military tribune to Syria; from whence he returned, when he had made one or two campaigns, and settled at Rome. He was promoted to the consular dignity by Trajan, in praise of



PLINY, THE YOUNGER.

whom he pronounced a famous oration, which is extant. He was afterward made proconsul of Bithynia, from whence he wrote to Trajan his curious and well-known

account of the Christians, and their manner of worship. The "Epistles of Pliny" are agreeably written, and very instructive; they were translated into English by Lord Orrey and Mr. Melmoth. He died after 112.

Pliocene, or **Pleiocene**, the epithet applied by Sir Charles Lyell to the most modern of the three periods into which he divided the Tertiary. Its distinguished character is that the larger part of the fossil shells are of recent species. Lyell divides it into the Older and the Newer Pliocene. In the Older, the extinct species of shells form a large minority of the whole; in the Newer, the shells are almost all of living species. Deshayes and Lyell considered that the Older Pliocene had 35 per cent. and the Newer 90 to 95 per cent. of the shells of recent species. Etheridge makes the number 40 to 60 per cent. for the Older and 80 for the Newer Pliocene.

There is a rich Pliocene flora in Italy. Mr. Gaudin and the Marquis Strozzi enumerate pine, oak, evergreen oak, plum, plane, elder, fig, laurel, maple, walnut, birch, buckthorn, etc. In the British Pliocene or Crag, Etheridge enumerates 328 genera, and 1,103 species of animals; 30 genera, and 57 species are mammalia. Both Vesuvius and Etna were in operation. In Mull there are plutonic rocks (granites and syenites) of this comparatively recent age. The climate, at first temperate, was becoming severe, and the Newer Pliocene was contemporaneous with part of the GLACIAL PERIOD (*q. v.*).

Plock, a town of Russian Poland, on the right bank of the Vistula, 60 miles N. W. of Warsaw. Its principal building is the cathedral, built in the 11th century. One of the oldest towns in Poland, Plock was the capital of ancient Masovia, and was severely ravaged by the heathen Prussians, the Lithuanians, and the Swedes. Pop. (1904) 30,000.

Plombières, a town in the French department of Vosges, 14 miles S. of Épinal; sprang into fashion through the favor of Napoleon III., though the virtues of its waters were known ever since the times of the Romans. There are nearly 30 springs, ranging in temperature from 66° to 150° F.; their waters are helpful against skin diseases, gout, rheumatism, dyspepsia, female complaints, etc. A handsome casino was opened in 1876, and there are picturesque walks and a park in the valley in which the village stands.

Plotinus, a Greek philosopher, founder of the Neo-Platonic school; was born in Lycopolis, Egypt, A. D. 203. He was trained in the school of Alexandria, under Ammonius Saccas, then visited the East, and about 244 settled at Rome, where he

spent the rest of his life as a teacher and writer, enjoying the esteem of the Emperor Gallienus, and of many leading persons. Porphyry, his most eminent disciple, wrote his life, and arranged and published his works, divided into six sets of nine books each ("Enneads"). Plotinus was a profound thinker and a deeply religious man, and his system, a sort of mystical idealism, a combination of Platonic with Oriental notions, has been very attractive to many great thinkers in ancient and modern times. He died in Campania, in 270.

Plots, compacts or conspiracies distinguished on the one hand from assassinations and on the other from rebellions. They involve the elements of secrecy and conspiracy, but have not always political assassination for their object, nor do those who carry them through, or attempt to do so, put arms in the hands of a great number of men. The subjoined list only professes to give a selection of the more noteworthy plots of history.

Catiline's Conspiracy, 63 B. C.
 Quirini-Tiepolo in Venice, 1310.
 Marino Falieri's Plot in Venice, 1355.
 Plot of Fieschi against Andrea Doria at Genoa, 1547.
 Raid of Ruthven in Scotland, 1582.
 Babington's Plot against Elizabeth, 1586.
 Death of Prince Demetrius in Russia, 1591.
 Gowrie Conspiracy in Scotland, 1600.
 Gunpowder Plot in England, 1605.
 Titus Oates' pretended Popish Plot, 1678.
 Meal-tub Plot, 1679.
 Rye-house Plot against Charles II., 1683.
 Assassination Plot to kill William III. of England, 1696.
 Plot of Catharine against Peter III. of Russia, 1762.
 Colonel Despard's Plot against George III., 1802.
 Plot of Cadoudal and Pichegru against Napoleon, 1802.
 Malet's Plot against Napoleon, 1812.
 Cato Street Conspiracy, 1820.
 Orsini's attempt on Napoleon III., 1858.
 Plot to assassinate President Lincoln, 1865.
 Numerous Nihilist plots in Russia, 1881-1891
 Abduction of Alexander of Bulgaria, 1886.
 See ANARCHISTS.

Plotz, Berthold von, a German military officer; born August 9, 1844; was educated at the Military School at Potsdam; served through the Austrian and French wars; was elected to the Prussian Chamber in 1892 and to the Reichstag, a year later. He was one of the founders and for some time parliamentary leader of the Agrarian League. He died in Dollingen, July 25, 1898.

Plover, the common English name of several wading birds; specifically, the golden, yellow, or green plover, *Charadrius pluvialis*. In winter the old male has all the upper parts sooty-black, with large golden-yellow spots on the margin of the backs of the feathers, the sides of the head, neck, and breast with ashy-brown and yellowish spots, the throat and lower parts white, the quills black. The summer plumage of the upper parts deep black, the

Plow

front and sides of the neck pure white, with great black and yellow spots. Lower parts mostly deep black. Length about 10 inches. Its nest, in a depression of the ground, is made of a few dry fibers and stems of grass; the eggs, which are highly esteemed as delicacies, are four in number, cream yellow or oil-green, with large blotches of umber-brown. Plovers are gregarious in habit, and have a wide geographical range. The gray plover is *Squatarola cinerea*.

Plow, an implement for making a furrow in land, the object being to stir the soil, make a bed for seed, cover seed, hill up earth to crops, lay out lines for planting trees or shrubs, and for other purposes, according to construction. It may be drawn either by animal or by steam power. Plows drawn by animal power, *i. e.*, by horses or oxen, are divided into swing plows and wheel plows, the former being without wheels. The wheel plow has a forward carriage to regulate the depth of furrow, one wheel running on the land and the other in the furrow. Besides these there are also plows for special purposes; as, sub-soil plows, draining plows, etc. A balance plow is one in which two sets of plow bodies and coulter are attached to an iron frame, moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the balance plow can be used without turning. Balance plows are used in steam plowing.

In bookbinding, an implement for cutting and smoothing the edges of books. It consists of two cheeks connected together by two guides and a screw passing through both cheeks. In one of the cheeks is fixed a cutting blade. It is worked by hand with a backward and forward motion. In weaving, an instrument for cutting the flushing parts of the pile or nap of fustian. In woodworking, a grooving plane in which the adjustable fence is secured to two transverse stems which pass through the stock of the plane, and are secured by wedges or screws. It is fitted with eight irons of various sizes, and is used in making grooves in doorstiles to receive the panel, and for similar purposes.

Plow Monday, in England, the Monday after Twelfth-day, or the end of the Christmas holidays, on which the plowmen used to resume their work. On this day they used also to draw a plow from door to door, and ask for money to buy drink.

Plouvier, Edouard (plöv-yā'), a French dramatist and story-writer; born in Paris, Aug. 2, 1821. Among his stories are: "The Christmas Tree" (1854); "The Beauty with Golden Hair" (1861). He wrote a volume of songs, "Sunday Refrains" (1856); and the comedies "The Steeple-

Plumbaginaceæ

Chase" (1851), "Winter Night's Dream" (1854), "A Household Crisis" (1858), "The Dragooness" (1874); also "The Late Capt. Octave" (1859). He died in Paris, Nov. 12, 1876.

Plum, the fruit of *Prunus domestica*, the common plum, a sub-species of *P. communis* or that tree itself. It is a native of the Caucasus and Asia Minor, whence it was introduced into Europe at a very early period. As it is now in gardens, it is a tree of 15, or 20 feet high, generally with spineless branches, ovate or lanceolate leaves, and white flowers, single or in pairs; the fruit is a fleshy drupe with a hard kernel, and a skin covered with a glaucous bloom. It has run into more than 300 varieties.

Plumatella, a family of *Plumatellidæ*. It has the cœnœcium tubular, the tubes distinct, and the ectocyst pergamentaceous. Twelve species are known.



PLUMATELLA.

a, natural size; b, a group enlarged; c, anal orifice.

Plumatellidæ, a family of phylactolæmatous Polyzoa, sub-order *Lophopea*. The cœnœcium is rooted. The family is divided into two groups: (1) Comprising the genera in which the lophophore is furnished with two long arms, *Pectinatella*, *Lophopus*, *Aleyonella*, and *Plumatella*; (2) Containing a single genus, *Fredericella*.

Plumbaginaceæ, or **Plumbagineæ**, leadworts; an order of perigynous exogens, tribe Cortusales. Herbs or undershrubs, with alternate or clustered, undivided, exstipulate, somewhat sheathing leaves, occasionally dotted. Flowers in loose panicles or in heads; calyx tubular, plaited, persistent, sometimes colored; corolla thin, monopetalous or with five petals; stamens definite, opposite the petals, ovary superior, of five, three, or four valvate carpels, one-celled, one-seeded. Fruit a nearly indehiscent utricle. Sea coasts in many

lands. The known genera number 8; species, 250.

Plumbago. See BLACK LEAD.

Plume-bird, a name applied to the *Epimachinæ*, or long-tailed birds of paradise.

Plumed Knight, a name given to James G. Blaine, and originating in a speech made by Col. Robert G. Ingersoll, in nominating Mr. Blaine for the presidency, in which he said: "Like an armed warrior, like a plumed knight, James G. Blaine marched down the halls of the American Congress and threw his shining lance full and fair against the brazen forehead of every defamer of this country and maligner of its honor."

Plummet, a plug of lead or other metal used for sounding; anything used as a test or gauge; or a ball of lead for a plumb-line.

Plum Pudding, a national English and American dish. The earliest recipe known is by the Chevalier d' Arvieux, about 1655, viz.: $\frac{1}{2}$ lb. beef suet, $\frac{1}{2}$ lb. raisins, $\frac{1}{2}$ lb. currants, $\frac{1}{2}$ lb. sultanas, $\frac{1}{4}$ lb. mixed peel, $\frac{1}{4}$ lb. bread-crumbs, $\frac{1}{4}$ lb. flour, one lemon, $\frac{1}{2}$ lb. moist sugar, four eggs, one gill of milk, one wineglass of brandy, two ounces almonds, half a nutmeg, a little salt. Chop the suet finely, stone the raisins, clean and pick the currants, blanch and chop the almonds, cut the candied peel in thin shreds. Mix all very well together. Turn into a well-greased basin, cover with a cloth, and boil for four hours, or, better, steam for 12 hours. Serve with brandy or sweet sauce.

Plumule, a minute germinating point or seed bud within the cotyledon of a dicotyledonous plant, or at one side of the cotyledon in a monocotyledonous one. It is a continuation of the tendrils, but it buds upward, while the radicle does so downward. It is part of the embryo, and may be divided into caulicle and gemmule.

Plunger, in ordnance, a form of striker used in some breech-loading firearms; a firing pin. In pottery, a boiler in which clay is beaten by a wheel into a creamy consistence. In pumping, a long solid cylinder employed as a piston in a force-pump. In recent years the word has become a popular designation of an exceptionally bold speculator in stocks, etc.

Plurality, in ecclesiastical law, the holding by the same person of two or more benefices. Pluralities were forbidden by the canon law, but the bishops and the Pope assumed the right of granting dispensations to hold them. They were prohibited by the Councils of Chalcedon (451), Nicæa (787), and Lateran (1215). In England pluralities in the Church are forbidden excepting in particular cases, such as where two liv-

ings are within 3 miles of each other, and the value and population small.

Plus, a character, marked thus +, used as a note or sign of addition. When placed between two quantities or numbers it signifies that these quantities or numbers are to be added together; thus, $a + b$ or $2 + 3$ means that a and b or 2 and 3 are to be added together.

Plush, a shaggy pile cloth of various materials. An unshorn velvet of cotton, silk, or mixed fiber, sometimes of a silk nap and cotton back. It has two warps, one of which is brought to the surface to make the nap. The warp is gathered in loops by wire, and cut in the manner of velvet. It is composed regularly of a woof of a single woolen thread and a double warp; the one wool of two threads twisted, the other goat's or camel's hair. Some imitation plushes are made of other materials.

Plutarch, a Greek biographer and moralist, a native of Chæronea, in Bœotia. In A. D. 66 he was a pupil of the philosopher Ammonius at Delphi. He visited Italy, and spent some time at Rome, lecturing there on philosophy as early as the reign of Domitian; but his name is not mentioned by any of the eminent Roman writers, his contemporaries. He returned to his native town, where he held various magistracies, and was appointed priest of Apollo. He was still living in 120, but the time of his death is not known. His great work is entitled "Parallel Lives," and consists of biographies of 46 eminent Greeks and Romans, arranged in pairs, each pair accompanied by a comparison of characters. They are written with a moral purpose, and present not orderly narratives of events, but portraiture of men, drawn with much graphic power, with great good sense, honesty, and kind-heartedness. Few books of ancient or modern times have been so widely read, so generally admired, as these "Lives." The English translation by the Langhorne is well known; less known, but more spirited, is that by North, made from Amyot's French version, and published in 1579. A new edition of the translation called Dryden's, revised by Clough, appeared in 1859. Most of Plutarch's other writings are ethical, and are entitled "Moralia."

Pluto, in mythology, the son of Saturn and Ops, inherited his father's kingdom with his brothers, Jupiter and Neptune. He received as his share the infernal regions. All the goddesses refused to marry him; but, on seeing Proserpine, the daughter of Ceres, gathering flowers in the plains of Enna, in Sicily, he became enamored of her, and immediately carried her away. Black victims, and particularly a bull, were the only sacrifices offered to him. The

Plutonic Rocks

dog Cerberus watched at his feet, the harpies hovered around him, Proserpine sat on his left, and the Parcae occupied his right hand. Pluto is called by some the father of the Eumenides.

Plutonic Rocks, rocks of igneous or aqueo-igneous origin, believed to have been formed at a great depth and under great pressure of the superincumbent rocks, or in some cases, perhaps, of the ocean. They have been melted, and cooled very slowly so as to permit them to crystallize. They contain no tuffs or breccias like the volcanic rocks, nor have they pores or cellular cavities. Under the plutonic rocks are comprehended granites, syenites, and some porphyries, diorite, tonalite, and gabbro. Tests of age are furnished by their relative position, by intrusion and alternation, by mineral composition, or by included fragments. They belong to all the leading geological periods, even the Tertiary.

Plutus, in Greek mythology, the god of riches. He was represented as blind, because he distributed riches indiscriminately; he was lame, because he came slowly and gradually; and he had wings, to intimate that he flew away with more velocity than he approached mankind.

Pluviose, the name adopted, in October, 1793, by the French Convention for the fifth month of the republican year. It commenced on Jan. 20, and was the second winter month.

Plymouth, a town and county-seat of Plymouth co., Mass.; on Plymouth Bay, and on the New York, New Haven, and Hartford railroad; 37 miles S. E. of Boston. The town has electric lights, waterworks, electric street railroads, court house, pub-



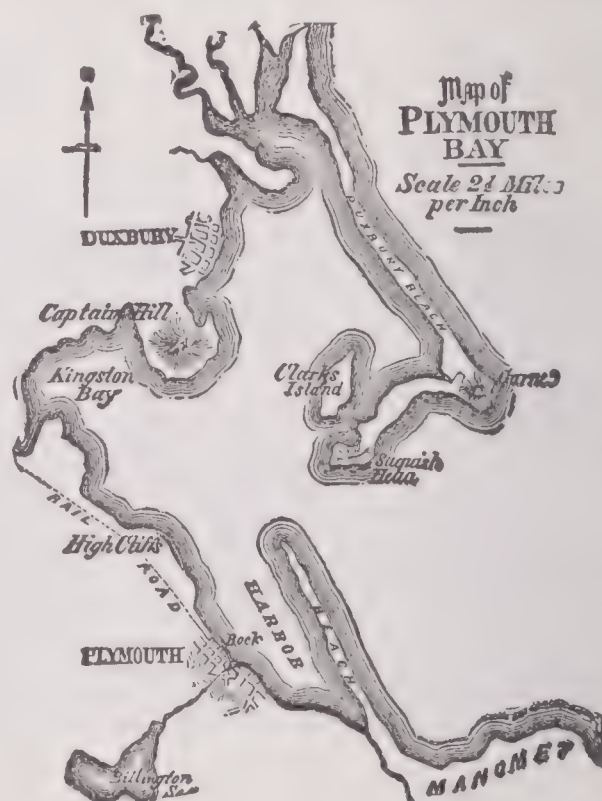
PLYMOUTH ROCK.

lic library, National and savings banks, and several daily and weekly newspapers. It has a large industry in cod fish, and manufactures of cordage, cotton, ducks, woolen and cotton goods, zinc, steel and iron products, cooperage, etc., and an assessed property valuation of nearly \$7,000,000. Plymouth is of importance as the spot where the Pilgrim Fathers landed

Plymouth

on Dec. 21, 1620. A portion of the rock on which they first stepped has been placed in front of Pilgrim Hall, in which are preserved old books, paintings, pictures, and other valuable relics. The rock itself is in Water Street, and is covered by a handsome granite canopy. Plymouth also has the National monument, 81 feet high, erected to the Pilgrims at a cost of \$200,000, and dedicated in 1889. There are also statues of Faith, Morality, Law, Freedom, and Education. Pop. (1890) 7,314 (1900) 9,592; (1910) 12,141.

Plymouth, a town and county-seat of Washington co., N. C.; on a small creek, a few miles S. of the Roanoke river, where it enters Albemarle Sound; 105 miles E. of Raleigh. It fell into the hands of the Federal troops early in 1862, and was taken



in April, 1864, by the Confederates with the aid of the iron-clad ram "Albemarle," which then became the principal defense of the place. The "Albemarle" was blown up with a torpedo by Lieut. W. B. Cushing on Oct. 27, and on Oct. 31, Plymouth was reoccupied by the Federal troops without resistance.

Plymouth, a seaport, municipal and parliamentary borough of England, in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plym and Tamar. Taken in its largest sense, it comprehends what are called the "Three Towns," or Devonport on the W., Stonehouse in the center, and Plymouth proper on the E. Plymouth proper covers an area of about 1 square mile, the site being uneven and somewhat rugged, consisting of a central hollow and two considerable eminences, one on the N., forming the suburbs, and the other, called the Hoe, on the S., laid out as a

promenade and recreation ground. The old Eddystone Lighthouse has been re-erected in Hoe Park, which also contains a handsome statue of Sir Francis Drake by Bøhm. The top of the Hoe offers magnificent land and sea views. The older parts of the town consist of narrow and irregular streets devoid of architectural beauty, but the newer parts and suburbs display an abundance of elegant buildings. The guild hall, a Gothic building, is the finest modern edifice (1870-1874), and has a tower nearly 200 feet high; among other buildings are St. Andrew's Church, the post-office, the Royal Hotel, theater, and the athenæum. The citadel, an obsolete fortification built by Charles II., is another object of interest. Plymouth is well defended both by land and sea, by a series of forts of exceptional strength provided with heavy ordnance. Charitable and educational institutions abound; the latter include a marine biological laboratory. The manufactures are not very extensive, and chiefly connected with ships' stores; but the fisheries are valuable, and Plymouth has a large export and coasting trade. Its chief importance lies in its position as a naval station. Thanks to extensive and sheltered harbors, Plymouth rose from a mere fishing village to the rank of foremost port of England under Elizabeth, and is now as a naval port second only to Portsmouth. To secure safe anchorage in the sound a stupendous breakwater has been constructed at a cost of about \$10,000,000. The Western Harbor, or the Hamoaze (mouth of the Tamar), is specially devoted to the royal navy, and here (in Devonport, which see) are the dockyard, and Keyham steam yard; the victualling yard, marine barracks, and naval hospital being in Stonehouse. The mercantile marine is accommodated in the Eastern Harbor, the Catwater (200 acres), or estuary of the Plym, and in Sutton Pool, and the Great Western Docks in Mill Bay. Plymouth sends two members to the House of Commons, while Devonport also sends two. Plymouth is supplied with water from Dartmoor by a "leat" or channel constructed by Sir Francis Drake. Pop. (1901) 107,509.

Plymouth Brethren, a body which arose almost simultaneously in Dublin and Plymouth, about 1830, and, as they called themselves "The Brethren," outsiders came to know them as "Plymouth Brethren" from the town where they had fixed their headquarters. Their chief founder was a lawyer, named Darby, who had taken orders. Their communities are of what is known as the Evangelical Calvinistic type, and many of them maintain that only among themselves is true Christianity to be found. They have no regular ministry,

every brother being at liberty to prophesy or preach whenever moved to do so. They baptize all adults, whether previously baptized or not, and observe the Sacrament of the Lord's Supper weekly. They are rigid Predestinarians and expect the millennium.

Plymouth Rock. See PLYMOUTH (Mass.).

Plymouth Sound, an arm of the sea, on the S. W. coast of England, between the counties of Devon and Cornwall. It is about 3 miles wide at its entrance, bounded by elevated land, which descends abruptly to the sea. It contains Drake Island, which is fortified, and the celebrated Plymouth breakwater. See PLYMOUTH.

Pneumatic Action, in organs, any portion of the action in which direct leverage is superseded by intermediate bellows, tubes, or valves, worked by wind at a pressure higher than ordinary. Pneumatic draw-stop action is the mechanism by which the sliders of an organ are moved backward and forward by means of small pneumatic bellows. Pneumatic lever to keys is an arrangement by which a manual or pedal key admits compressed air into a pneumatic bellows, which, by its expansion, performs the direct leverage of the trackers, back-falls, or other action.

Pneumatic Dispatch, propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive, but propulsion by compressed air has of recent years been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in warehouses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the telegraph service of large cities. Pneumatic dispatch, which has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages, was first introduced in London by Latimer Clark in 1853, improved by Varley 1858, and again by Siemens in 1863. The vehicles charged with the messages, technically called "carriers," are forced through leaden tubes connecting the various stations, and from 1½ to 3 inches in diameter, by means of air pressure at one end, or sucked through by a partial vacuum at the other. The invention of Latimer Clark and Varley required a separate tube between each pair of stations, and admitted of only a single dispatch at a time; but a system of laying tubes in circuit for the continuous transmission of dispatches, by means of an uninterrupted air current in one direction, was adopted in Berlin by Siemens and Halske in 1863, and introduced in London in 1870. Both systems are in use in London with modifications to suit special traf-

Pneumatic Gun

fig. The tubes (some 40 miles) run in all directions. In the central districts, where the transmission is heavy, the stations are connected by a double tube, a receiving and a dispatching one, forming a complete circuit, with a column of air always passing through it, and which is moved either by pressure, or by vacuum, or both. The up and down lines may be opened through their entire length, or blocked by switch boxes at an intermediate station. The terminal stations can send carriers to be stopped by the switch box at an intermediate station; and the intermediate station, when it knows a through carrier to be coming for one of the termini, can, if it happen to have any messages to send to that terminus, switch out the through carrier and insert its own messages without appreciable delay. The carriers in the three-inch tubes hold about 50 messages. It is estimated that work may be performed by one of these tubes which would require six wires and 12 clerks. Pneumatic tubes are also in growing use in Liverpool, Manchester, Glasgow, Dublin, etc. The circuit system, but not with a continuous current, is extensively used in Paris. The tubes are of iron, two feet in diameter. Trains leave the central station at fixed intervals and make the circuit. Other European cities have similar systems. New York, Philadelphia, and other American cities use a pneumatic mail dispatching system. The pneumatic dispatch plant connected with the Philadelphia postoffice is in many respects the most complete plant of the sort in the world. The line is double, providing for transmission in both directions without interference. A single compressor serves to maintain the pressure in both the sending and returning tubes, a switch mechanism being provided at the sub-station to deliver the carriers to a receiver, while the air passes through a branch to the return line. The same air is switched in again at the starting point, provision being made for a slight increase to offset the leakage. It has been in use since Feb. 17, 1893. In the annual report of the Postmaster-General to Congress for 1901, he advocated the increased use of the pneumatic dispatch service throughout the United States.

Pneumatic Gun, a gun operated by compressed air, the Sims-Dudley pneumatic gun which proved its value in the American-Spanish War in Cuba in 1898, differs materially from the pneumatic guns used on the "VESUVIUS" (*q. v.*). It is a light field piece, weighing only 270 pounds, mounted on a carriage weighing 550 pounds. Both gun and ammunition can easily be handled by four men, while one mule can carry the gun and another the carriage, even up steep inclines. In the absence of mules, five men can carry the gun and five men the car-

Pneumatic Trough

riage, up any ordinary elevation by using the branch of a tree as a carrying bar. The gun can always be assembled and ready for action in two minutes' time. The gun consists essentially of two tubes, one placed over the other, the upper one being a little less than 14 feet long. This is known as the projectile tube. It is made of a composition metal, specially manufactured for the purpose, possessing a tensile strength of about 80,000 pounds to the square inch. It is smooth-bore, the rotation of the shell being assured by a vane on the projectile, and the diameter of the bore in the smaller gun is $2\frac{1}{2}$ inches. Below the projectile tube is the expansion or combustion chamber, which consists of a tube of steel $4\frac{1}{2}$ inches in diameter and 7 feet long. This tube is directly connected to the projectile tube by openings at its rear end and at the top. It is also provided at its rear end with an inner firing tube which projects into the outer tube for a short distance. The projectile tube and the combustion chamber are each provided with a breech-mechanism of approved form, adapted especially for use in this gun. In firing, the breech-mechanisms are thrown open by a single motion, the loaded projectile placed in the projectile tube and an ordinary cartridge shell, containing 7 to 8 ounces of smokeless powder, inserted in the firing tube. The firing is done by pulling a lanyard in the usual manner. The projectile contains an explosive charge of about four pounds of Nobel's gelatine and is provided with a Merriam fuse, which can be arranged either to explode the gelatine upon impact or at any time thereafter up to six or seven seconds. The range of this particular gun is from one to two miles, depending on the elevation, and it can be fired five or six times per minute. See DYNAMITE GUN.

Pneumatics, the science which treats of the mechanical properties of air and other gases, investigating their weight, pressure, elasticity, condensation, etc. Comprehended under it are descriptions of such machines as the air gun, the air pump, the diving bell, etc. Air being a vehicle of sound, pneumatics includes also the science of acoustics.

Pneumatic Tire, a rubber tire made hollow and then inflated with air. In common use for the wheels of bicycles, buggies, sulkies, and other vehicles. Specially adapted for ease and speed. The quickest records of racing sulkies have been made where the pneumatic tire has been used.

Pneumatic Trough, a vessel used in the collection of gases. It is usually made of iron or copper, and is provided with a shelf for holding the jars or bottles to be filled with gas. The shelf is perforated with one or more holes, to receive the end of the delivery tube of the gas apparatus, and the

water in the trough kept at about one inch above the level of the shelf.

Pneumogastric Nerve, a nerve, called also *par vagum*, which, proceeding from the neck to the upper part of the abdomen, supplies branches to the pharynx, œsophagus, stomach, liver, spleen, and respiratory passages.

Pneumonia, inflammation of the lung, usually caused by exposure to cold or wet, a cold draught or chill after being overheated, injury to the chest, irritation, or as a secondary affection in smallpox, typhoid or puerperal fever, and other low wasting diseases; it may also be caused by long continued congestion of the lung substance, particularly in heart disease, or in old and weak people who are bedridden from any cause. It appears as hypostatic pneumonia, and in some malarial districts it occasionally becomes epidemic. It commences with hyperæmia and œdema, followed by fibrinous exudations in the interior of the air cells and capillary bronchi, undergoing many changes of the most serious character, such as abscess, purulent infiltration, gangrene, etc. The right lower lobe is the most frequent point of attack, bronchitis and pleuritic exudations are common accompaniments. Herpes is frequently observed on the face and lips on the third or fourth day; prostration, dry brown tongue, cracked lips, with viscid expectoration of a rusty-nail color, and in the acute hepatization stage, red blood-tinged sputum, are the usual symptoms, with fine crepitation, like the rustling of a hair rubbed between the fingers. The true crepitant rhonchus is heard all over the affected part. Pneumonia terminates generally in resolution and recovery, but sometimes in death from collapse and exhaustion.

Pneumonia, Microbe of. See BACTERIA.

Po, the largest river of Italy, rises on Monte Viso, one of the Cottian Alps, at an altitude of 6,405 feet, close to the French frontier. It flows E. for upward of 20 miles, when, arriving before Saluzzo, it emerges from its rocky defiles and enters upon the plain. From Saluzzo it flows N. N. E. past Turin to Chivasso; there it changes its course toward the E., in which direction it flows to its embouchure in the Adriatic. Upward of 55 miles from its mouth, above Ferrara, it begins to form its delta, 60 miles wide from N. to S. The delta is growing rapidly in area. Ravenna, a city once on the seashore, now stands 4 miles inland. The Po receives from the left the Ticino, Adda, Mincio, and other streams and from the right the Trebbia and others. It has an entire length of 360 miles, and drains an area of nearly 28,900 square miles. Below Piacenza its stream has from ante-Roman days been artificially embank-

ed along great stretches with double lines of embankments on each side. It has been and is at all times difficult to cross, owing to its width and, still more, the great volume of its waters; hence the strategic and commercial importance of such places as Piacenza and Turin, where the easiest fords are.

Poaching, the trespassing on another's property for the purpose of killing or stealing game or fish. According to the law of England, when a person's land adjoins a stream where there is no ebb and flow that person is assumed to have an exclusive right to fish in the stream as far as his land extends, and up to the middle of the stream; and so also when a person's land incloses a pond, the fish in that pond belong to him. Where several properties are contiguous to the same lake the right of fishing in that lake belongs to the proprietors, in proportion to the value of their respective titles. Exclusive right of fishing in a public river, that is, one in which there is ebb and flow up to the tidal limit, or a portion of the sea, is held by some proprietors by virtue of royal franchises granted prior to the Magna Charta. Any person, not an angler, found fish poaching on private property is liable to a maximum fine of \$25 in addition to the value of the fish; an angler's fine does not exceed \$10. If the act is committed on land belonging to the dwelling house of the owner it becomes a misdemeanor, and such a fish poacher, when caught in the act, may be arrested by anybody. Anglers cannot be arrested, even in the latter case, but the penalty extends to \$25. The owner or his servant may deprive the angler of his fishing gear in lieu of a fine. The same law applies also to Ireland. In Scotland, as a general rule, the right of catching fish other than salmon belongs to the owners of the land on the banks of the waters. As to property in salmon fishings that is held to be originally vested in the crown, not only for the rivers of Scotland but also for the coasts, and no person accordingly is allowed to fish for salmon unless he possesses a grant or charter from the crown enabling him to do so. The fact is, however, that nearly all the chief landed proprietors do possess such rights. The punishment for poaching salmon in Scotland is a fine not less than \$2 nor more than \$25, together with the forfeiture of the fish taken, and the boat, tackle, etc., employed by the poacher, if the sheriff or justice think fit. Anyone not an angler poaching trout or any other fresh-water fish renders himself liable to a penalty of \$25, besides forfeiting the fish caught. If he be caught in the act of using a net for poaching such fish he may be arrested, but not unless; but even when he may not be arrested his boat and fishing implements may be seized. A per-

Pocahontas

son who merely angles for trout in places where he has not got leave to fish is only liable to an action at law.

Pocahontas, daughter of Powhatan, a powerful Indian chief of Virginia; born about 1595. She displayed a friendliness toward the British colonists, first at 12 years of age, in saving the life of Capt. John Smith, who had been captured and condemned to death by her father, and on several occasions making known to the English their danger when about to be attacked. In 1612, while on a visit to a neighboring tribe, she was seized, and held as a hostage by the English, as a safeguard against the hostility of her tribe. While on shipboard she became acquainted with, and married John Rolfe, an Englishman, who took her to England, where, in 1616, she was presented at court. She had one son, from whom numerous wealthy families of Virginia claim descent. She died in England, while preparing to return to America, in 1617.

Pochard, or **Poachard**, the *Anas ferina*; is ashy, narrowly striated with black, the head and top of the neck red, the lower part of the neck and the back brown, the bill of a lead color. It is found in the N. of Europe (including Great Britain) and America, building among reeds. Its cry has been compared to a serpent's hiss. Its flight is more rapid than that of the wild duck, and a flock of them in the air takes the form of a platoon rather than of a triangle.

Pocci, Franz, Count von, a German poet and musician; born in Munich, Germany, March 7, 1807. Besides several light musical dramas he wrote an opera, "The Alchemist," and a number of songs and sonatas; a volume of "Poems" (1843); "Hunting Songs" (1843); "Student Songs"; several books for children, admirable alike for literary form and artistic illustration — *e. g.*, "The Little Rose Garden," a prayer-book; "A Little Book of Proverbs," etc. He died in Munich, May 7, 1876.

Poco, a direction in music; a little, as *poco a poco*, little by little; *poco animato*, rather animated; *poco lento*, rather slow; *mosso poco meno*, rather less quick; *poco piano*, rather soft; *poco piu allegro*, rather faster; *poco presto*, somewhat rapid.

Pococke, Richard, an English traveler; born in Southampton, England, in 1704, and educated there and at Corpus Christi College, Oxford. Precentor successively of Lismore and Waterford, then Archdeacon of Dublin (1745), in 1756 he was consecrated Bishop of Ossory, and was translated to Meath. His travels, which took up nearly nine years of his life, and in which he must have ridden some 52,000 miles, are described in two folios dealing with his four years'

Podiebrad

wanderings in Syria, Egypt, and Mesopotamia (1743–1745), in a volume on his tours in Scotland (Scottish History Soc., 1887), in two on his tours through England (Camden Soc., 1888–1889) and in one on Ireland (edited by J. T. Stokes, 1891) — books that are as dull as they are valuable. Pococke was, moreover, the pioneer of Alpine travel, for in 1741 he led a dozen Englishmen, all strongly armed, to the Vale of Chamouni, whose grateful inhabitants carved his name and the date on a huge granite boulder close to the Mer de Glace. He died very suddenly in Charleville, near Tullamore, Sept. 15, 1765.

Pod, in botany, a general term applied to various forms of seed vessels of plants, such as the legume, the loment, the siliqua, the silicle, the follicle, the capsule, etc.

Podagra, that species of gout which recurs at regular intervals, generally in spring or autumn, attacking the joints of the foot, particularly of the great toe, attended with a sharp burning pain, and rendering the whole foot so sensitive that the slightest pressure, or even the agitation occasioned by a strong draught of air, causes torture. The pain can be assuaged by reducing the inflammation, promoting the secretion of the gouty matter, and by suitable diet and mode of living. See GOUT.

Podargus, a genus of Australasian nocturnal birds of the goatsucker family. Like the goatsuckers their mouths have a very wide gape. By day they are excessively drowsy. There are several species, one of which, Cuvier's podargus (*P. Cuvieri*), is known among the Australian settlers by the name of "more pork" from its strange cry.

Podesta, the title of certain officials sent by Frederick I. in the 12th century to govern the principal cities of Lombardy. Also a chief magistrate of the Italian republics of the Middle Ages, generally elected annually, and intrusted with all but absolute power; and an inferior municipal judge in some cities of Italy.

Podiebrad, George Boczko, King of Bohemia; born of a noble family in Podiebrad, April 6, 1420, and became an adherent of the moderate party of the Hussites. When the Catholic barons (1438) carried the election of Albert V. of Austria (II. of Germany), Podiebrad allied himself with the Utraquists in Tabor, who offered the sovereignty of Bohemia to Casimir, King of Poland. After forcing Albert to raise the siege of Tabor and retire to Prague, Podiebrad was recognized as the leader of the Utraquists; then he seized on Prague (1448), and got himself made governor or regent of Bohemia, from 1453 to 1457, for the young king Ladislaus. On the death of Ladislaus, Podiebrad was chosen his successor, and was crowned early in 1458.

By skilful management and wise policy he succeeded in allaying the bitternesses of religious zeal, but only for a while. In 1462 he decided to uphold the terms of the *compactata* of Prague (1433); this angered the Pope, Pius II., and he was only prevented from excommunicating Podiebrad through the special intervention of the emperor. The next Pope, however, Paul II., did in 1466 promulgate against him the ban of excommunication. Matthias Corvinus of Hungary was the only prince who took the field to enforce it; but him Podiebrad surrounded at Wilamow (1469) and forced into a truce. Nevertheless Matthias was crowned king by the Catholic barons at Olmütz immediately afterward. Podiebrad died March 22, 1471, having already made arrangements whereby a Polish prince should succeed him.

Podium, a low wall, generally with a plinth and cornice, placed in front of a building. A projecting basement round the interior of a building, as a shelf or seat, and round the exterior for ornamental adjuncts, as statues, vases, etc. Sometimes it was surmounted by rails, and used as the basement for the columns of a portico.

Podolia, or **Kamenetz**, a government of West or "White" Russia, N. of Bessarabia, and bordering on the Austrian frontier; area, 16,224 square miles; pop. (1897) 3,031,513, the majority of whom are Russniaks. The surface is a table-land, strewn with hills; nearly three-fourths is either arable or available for pasturage.

Podophthalmia, or **Podophthalmata**, in zoölogy, stalk-eyed Crustaceans, a legion of Malacostraca. The eyes are on movable foot-stalks; branchiæ almost always present; thorax covered more or less completely by thoracic shield. There are two orders, *Decapoda* and *Stomapoda*.

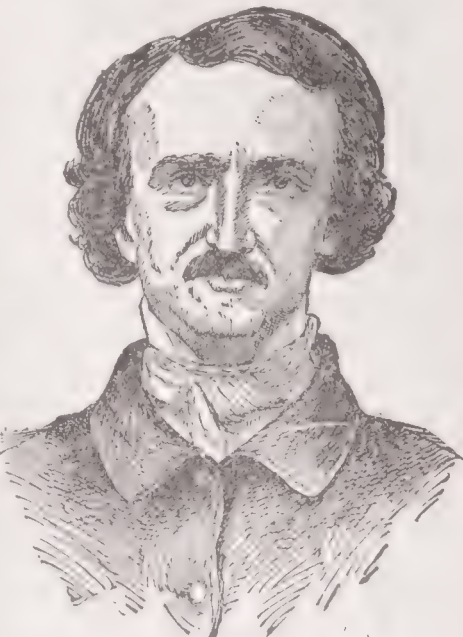
Podophyllum, in botany, a genus of *Ranunculaceæ*, now placed under the tribe *Actææ*. *P. peltatum* is the May apple, called also the wild lemon. The fruit is eatable, but the leaves are poisonous and the whole plant narcotic. The fruits of *P. emodi*, a Himalayan herb, are eaten by the natives, but Europeans regard them as insipid.

In pharmacy, podophyllin, an amorphous brownish-yellow resin tinged with green, extracted from the root of *P. peltatum* by alcohol. It has an acrid, bitter taste, is slightly soluble in water and ether, but very soluble in alcohol; a safe and certain purgative, superior in activity to the resin of jalap.

Poduridæ, a family of the modern Collembola, with three genera, *Achorutes*, *Podura*, and *Xenylla*. Body cylindrical; the appendages of the fourth abdominal seg-

ment developed into a saltatory apparatus.

Poe, Edgar Allan, an American poet and story-writer; born in Boston, Jan. 19, 1809. Left an orphan early, he was adopted by John Allan, of Richmond, Va., and at the age of 19 left this home and published his first volume of verse at Boston. He was a cadet at the United States Military Academy, 1830-1831; and subsequently was editor of the "Southern Literary Messenger," 1835-1837; of the "Gentleman's Magazine," 1839-1840; of



EDGAR A. POE.

"Graham's Magazine," 1841-1842; and of the "Broadway Journal," 1845. He also contributed to the "Evening Mirror," "Godey's Lady's Book," the "Whig Review," and other periodicals. He projected a magazine to be called "Literary America," and to aid it, lectured in New York city and through the South, 1848-1849. A complete list of his works in book form includes: "Tamerlane and Other Poems" (Boston, 1827); "Al Aaraf, Tamerlane, and Minor Poems" (Baltimore, 1829); "Poems" (2d ed., including many poems now first published, New York, 1831). The "Narrative of Arthur Gordon Pym, of Nantucket" (New York, 1838); "The Conchologist's First Book" (Philadelphia, 1839); "Tales of the Grotesque and Arabesque" (Philadelphia, 1840); "The Prose Romances of Edgar A. Poe" (Philadelphia, 1843); "The Raven and Other Poems" (New York, 1845); "Mesmerism: In Articulo Mortis" (London, 1846); "Eureka, a Prose Poem" (New York, 1848). After his death there were republished "The Liberati: Some Honest Opinions about Autorial Merits and Demerits, with Occasional Words of Personality," etc., edited by R. W. Griswold (New York, 1850); "Tales of Mystery, Imagination, and Humor; and Poems," edited by Henry Vizetelly (London, 1852). The definitive edition is the one edited by E. C. Stedman and G. E. Woodberry (10 vols., Chicago, 1894-1895). Poe died in Baltimore, Md., Oct. 7, 1849.

Poelenburgh, Cornelis van, a Dutch painter; born in Utrecht in 1586, became a pupil of Bloemaert, and afterward went to Italy. He confined himself principally to small landscapes, in which he excelled.

Poerio

Charles I. invited him to England, where he painted a portrait of the king and other works. His works are rare, and esteemed for delicacy of touch and sweetness of coloring. In 1627 he returned to Utrecht, where he died in 1667.

Poerio, Carlo, an Italian patriot; born Dec. 10, 1803, son of a Neapolitan lawyer who had suffered imprisonment and exile in the cause of liberty. He accompanied his father into exile, but on his return became an advocate at Naples. He was repeatedly imprisoned for his services to the liberal cause; and in 1848 he organized the famous demonstration of Jan. 27, which was destined to produce the constitution of Feb. 10. Under it he was successively nominated Director of Police and Minister of Public Instruction; but he soon resigned, and was appointed deputy for Naples to the Parliament. On July 19, 1849, he was arrested, charged with being a member of a secret society, "the Italian Unity," and condemned to irons. With 15 others he was confined in one small chamber in the island-prison of Nisida. Diplomatic protests from various governments — Mr. Gladstone's was declared by Garibaldi to have sounded the first trumpet-call of Italian liberty — and eloquent denunciations of the royal tyranny moved Ferdinand II. at last in 1858 to ship 66 prisoners to the United States. They persuaded the captain to land them at Cork, and Poerio returned by London to Turin. There he became a member of the Parliament, and in 1861 its vice-president. He died in Florence, April 28, 1867. The elder brother ALESSANDRO, born in 1802, who fell in battle for the liberation of Venice, shared his father's exile, studied in Germany, settled in Florence, and devoted his life mainly to poetry and patriotism. His poems, which contain some of the most stirring Italian songs of freedom, have been repeatedly published. He died in 1848.

Poet Laureate, an office in the household of the sovereigns of Great Britain, the appellation having its origin in a custom of the English universities, which continued to 1512, of presenting a laurel leaf to graduates in rhetoric and versification, the king's "laureate" being a graduated rhetorician in the service of the king. The first appointment of a poet laureate dates from the reign of Edward IV., the first patent being granted in 1630. It was formerly the duty of the poet laureate to write an ode on the birthday of the monarch, but this custom has been discontinued since the reign of George III. Among those who have held this office may be mentioned Dryden, Southey, Wordsworth, and Tennyson. Alfred Austin is the present holder of the office.

Poets' Lake

Poetry, that one of the fine arts which has for its object the creation of intellectual pleasure by the use of imaginative and passionate language, which is generally, though not necessarily, formed in regular measure; the art of producing illusions of the imagination by means of language. Also poetical, imaginative, or passionate language or compositions, whether expressed rhythmically or in prose. Thus, many parts of the prose translations of the Bible are genuine poetry. In its widest sense, poetry may be defined as that which is the product of the imaginative powers and fancy, and which appeals to these powers in others.

The ancient Hindu Vedas consists in large measures of rhythmical hymns. Hindu poetry reached its highest development in the epics of the Ramayan and the Mahabharat. Specimens of that of the Hebrews, made conspicuous to the English reader by being printed in separate lines in the revised version, are found in Gen. iv: 23-24, ix: 25-27, xxvii: 39, 40, xlix: 2-27, and Exodus xv: 1-18, 21. It reached its highest development in the books of Job and of Psalms. The poetry of the Greeks began with Homer and Hesiod, and continued till about 500 B. C. The chief poets of Rome came late on the scene, Vergil being born 70 B. C., and Horace 65 B. C. Geoffrey Chaucer, the father of English poetry, died A. D. Oct. 25, 1400; John Barbour, author of the "Bruce" (1373), was the first Scotch poet. Of the English poets of high genius were Chaucer in the 14th, Shakespeare and Spenser in the 16th century, Milton and Dryden in the 17th, Pope and Cowper in the 18th, Byron, Keats, Shelly, Tennyson, etc., in the 19th. Of Scotch poets, Burns in the 18th century. Of American poets, Longfellow, Poe, Bryant, and many others, all living in the 19th century.

Poets' Corner, **The**, in Westminster Abbey, the S. corner. This is merely a popular name. The poets represented are: Addison, Beaumont, S. Butler, Campbell, Cowley, Davenant, Drayton, Dryden, Gay, Goldsmith, Gray, Dr. Johnson, Ben Jonson, Longfellow, of America, Macauley, Mason, Milton, Philips, Prior, Rowe, Shakespeare, Shadwell, Sheridan, Spenser, and Thomson.

But there is no memorial to such poets as the following: Akenside, Mrs. Browning, Byron, Burns, Carew, Cartwright, Chaucer, Churchill, Coleridge, Collins, Cotton, Cowper, Crabbe, Denham, Donne, Fletcher, Mrs. Hemans, Herbert Herrick, Hogg, Hood, Keats, Miss Landon, Lee, Lovelace, Marlowe, Marston, Massinger, Moore, Parnell, Pollok, Pope, Raleigh, Ramsay, Rossetti, Scott, Shelley, Shenstone, Southern, Southey, Waller, Wither, Wolfe, Wordsworth, Young, and several others.

Poets, Lake. See LAKE DISTRICT: LAKE SCHOOL.

Poggio, Bracciolini, Gian Francesco, an Italian humanist; born in Castel Terranuova, near Florence, Feb. 11, 1380. By his untiring research of the monastery libraries of Switzerland and Germany, he brought to light MSS. supposed to have been lost, of works of the ancient classics, as Quintilian, Valerius Flaccus, Ascanius, Statius, Ammianus, and many others. He translated into Latin several of the Greek classics. His own writings are: "Facetiæ," a work of the same questionable character as others of the same title—the book had 26 editions at the end of the 15th century; "Of the Variances of Fortune"; a "History of Florence"; "The Miseries of Human Life"; "The Infelicity of Princes"; "On Marriage in Old Age"; "Dialogue Against Hypocrites." He died in Florence, Oct. 30, 1459.

Pogodin, Michail, Petrovich, a Russian historian; born in Moscow, Nov. 23, 1800. He wrote: "On the Origin of the Russians" (1822); "Character of Ivan the Terrible" (1828); "Complicity of Godunov in the Murder of Demetrius" (1829); "Marfa Pozadniza," a tragedy (1831); "Stories" (3 vols. 1833); "History of the Pseudo-Demetrius" (1835); "Russian History" (7 vols. 1846–1854; the work was left unfinished); "Researches on the Historic Basis of Serfdom" (1858); "The First Seventeen Years of the Reign of Peter the Great" (1875). He died in Moscow, Dec. 20, 1875.

Poi, a sort of porridge made from flour obtained by grinding the roots of tara or taro, a plant grown in most of the Polynesian islands, especially in Hawaii. The plant grows to the height of about two feet in small beds, which are so constructed that they may be flooded like rice. The tops are used by the natives as pot herbs. The root is ground on stones by the native women, and made into mush which, among the Hawaiians of the lower classes, is eaten with the finger out of a common dish.

Poining, in the law of Scotland, means the seizing and selling of a debtor's goods under process of law, or under the warrant of a heritable security, in order to pay the debt. It is either real or personal. Real poining is the attaching of goods or movables on the land over which some heritable security exists. It is one mode in which heritable security is made effectual. Thus, the superior of lands can point the ground to obtain payment of his feu-duties; and the holder of a heritable bond can do the same in order to recover his debt. Personal poining is the mode in which a decree of the court is made effectual by the messenger or bailiff seizing the movables of the debtor. It may not proceed till the debtor has been charged to pay the debt and the days of charge have elapsed. The debtor's

goods being pointed, they are appraised or valued, and the messenger reports his execution to the sheriff, or other judge ordinary, who grants warrant to sell the goods by public roup after advertisements. The net amount of the sale is paid over to the creditor, or, if no purchaser bid for them, they are delivered to the creditor at the appraised value. There is also another kind of pointing, called a pointing of stray cattle, which takes place whenever the cattle of a stranger trespass on lands, in which case the owner or occupier of the lands can seize them at his own hand, without judicial warrant, and keep them as a security till the damage done by the cattle is paid to the owner of the land. The pointer must, however, take care to keep the cattle in a proper place, and feed them. In England the word pointing is not used, the corresponding term being distress.

Poinsettia, a genus of *Euphorbiaceæ*, now merged in *Euphorbia* itself. *P. pulcherrima* is a highly ornamental stove plant, with rose-like whorls of bracts.

Point, in geometry, a quantity which has no parts, or which is indivisible, or which has position without magnitude. Points may be regarded as the ends or extremities of lines. If a point is supposed to be moved in any way, it will by its motion describe a line.

Point de Salle. See SALLE.

Pointed Arch, an arch struck from two centers and meeting above, forming a lancet shape. It is a feature of post-Norman Gothic.

Pointed Styles, the divisions of Gothic architecture in which the pointed arch is used.

Pointer, two stars, Merak and Dubhe, in Ursa Major, so called because they point to the pole, *i. e.*, a line joining them and produced will nearly strike the pole star. In bricklaying, a tool for clearing out to the required depth the old mortar between the courses of bricks in a wall, to be replaced by a fresh body of mortar. In shipbuilding, one of the pieces of timber fixed fore-and-aft and diagonally inside of a vessel's run or quarter, to connect the stern frame with her after body. Also called a snake piece. In navigation, a graduated circle, with one fixed and two adjustable radial legs. By placing them at two adjoining angles taken by a sextant between three known objects, the position of the observer is fixed on the chart. In railroad engineering, the adjusting of a switch. In stone-work, a stone-mason's chisel with a sharp point, used in spawling off the face of a stone in the rough. In zoölogy, *Canis familiaris*, variety *avicularis* (Linnæus), a variety of the domestic dog, with short hair and of variable color,

trained to point at prey. This was probably at first only the exaggerated pause of an animal preparing the spring, and was subsequently improved by training.

Poison. Professor Christison divides poisons into three great classes: Irritants, narcotics, and narcotico-acrids or narcotico-irritants. A fourth class is sometimes added, septics, consisting of animal poisons, such as the bites of rabid animals and venomous snakes, the stings of insects, and the poison generated by pestilential carbuncle, etc. An irritant poison produces violent pain and cramp in the stomach, nausea, vomiting, convulsions, etc. A narcotic poison produces stupor, numbness, drowsiness, coldness, and stiffness of the extremities, etc.; a narcotico-acrid poison produces a certain combination of the symptoms attendant on both the former classes. The chief irritants are the acids and their bases, some alkalies and their salts, the metallic compounds, as arsenic, mercury; the vegetable acrids or irritants, as some Cucurbitaceæ, Euphorbiaceæ, Ranunculaceæ, etc.; animal irritants, as cantharides; mechanical irritants, as glass, etc.; irritant gases, as chlorine, the vapor of nitrous acid, etc.; narcotic poisons, like opium, nightshade, prussic acid, etc.; narcotico acrids, such as strychnine, *Cocculus indicus*, and poisonous mushrooms. Savages poison their arrows with the milky juice of various Euphorbias or of the manchineel, or by the juice of two species of Strychnos. Both in man and in the inferior animals there is often a curious correlation between the color of the skin and hair and immunity from the action of certain vegetable poisons. Metallic poisons act on vegetabes nearly as they do on animals, that is, they are absorbed into the different parts of a plant, destroying the structure. Vegetable poisons, especially those which destroy animals by action on their nervous system, also cause the death of plants.

Poisoners. The use of deadly drugs has always been a favorite method with unscrupulous persons who desired to rid themselves of rivals or enemies. The knowledge of poisons is traced back to mythical times, the Greeks ascribing to Hecate, one of their goddesses, the discovery of poisonous herbs. The Egyptians were familiar with many poisons, including aconite, conium, and prussic acid. In the early history of India it is known that poisons were used for suicides, robbery and revenge, and even at the present time the most subtle and untraceable poisons are the product of that country. Socrates, the Greek philosopher, was condemned to drink the poisonous juice of the hemlock as a judicial punishment. Aconite, a powerful poison derived from the common garden plant wolfbane or monkshood, is largely used in medicine and as such has

been an instrument in the hands of would-be murderers. In the period between the 14th and 17th centuries there was a class of professional poisoners. These flourished in Venice in the 15th century and were employed by the Council of Ten to "remove persons obnoxious to the government." The Borgia family were celebrated for the number of murders they committed in this way. Secret poisoning became so alarmingly prevalent by 1648, that an investigation was ordered by Pope Alexander VII. It was discovered that there was a secret society of young matrons who met at the home of a woman named Hieronyma Spara, who supplied them with poisons with which to kill off their husbands. Thus the unusually large amount of young widows in Rome at that time was accounted for. Some 50 years later a similar society was discovered in Naples, and its leader, a woman, Tofana, was strangled. She sold a poison known as aqua tofana.

Poison Gland, a gland, probably a modification of one of the buccal salivary glands, situated behind and under each eye in the poisonous snakes, and rendering their bite dangerous or fatal.

In the bee the poison is secreted by two long and slender ducts, uniting and emptying their secretion into an oblong bag. In the scorpion the poison glands are lodged in the pyriform dilatation at the tail, terminated by the sting. In the typical spider the poison gland is an elongate oval vesicle, having the fibers of the contractile tissue arranged in spiral folds.

Poisoning. See ARSENICAL POISONING.

Poison Ivy, a climbing plant which closely resembles the woodbine and which is very irritating to sensitive skins. It may be distinguished from the woodbine by its having only three leaves on a twig, while all other harmless vines have five leaves, one for each finger of the hand. A simple remedy for the poison is a weak solution of common baking soda and water, applied immediately after exposure. A teaspoonful of soda dissolved in half a cup of hot water, cooled and applied with a soft linen handkerchief, is generally efficacious. A strong solution of salt and water applied in the same way is also good. Some bathe the parts with sweet spirits of niter three or four times a day. In severe cases a weak solution of carbolic acid or of sugar of lead may be used, but under the advice of a physician.

Poison Organ, any organ capable of inflicting a poisoned wound, whether connected with a poison-bag, as in Synanceia, or unconnected with any such apparatus, as in the sting rays, the weaver, and many of the Scorpænoids, where the mucus secreted

from the surface of the fish evidently possesses venomous qualities.

Poison Nut, a name for *Strychnos nux-vomica*, an evergreen tree of the natural order *Loganiaceæ*, the seeds of which yield strychnine. Also a name for the *Tanghinia venenifera*, of the natural order *Apocynaceæ*, the fruit of which is a drupe inclosing a kernel extremely poisonous. It used to be employed in Madagascar as an ordeal test of guilt or innocence, the result generally being the death of the suspected person.

Poisson, Simeon-Denis, a French geometer; born in Pithiviers, department of Loiret, June 21, 1781; and displaying an aptitude for mathematics, he was received into the École Polytechnique in 1798. The striking talent he thus early exhibited attracted the notice of Lagrange and Laplace, both of whom anticipated for him a brilliant future. In 1802 he became a professor in the Polytechnique; in 1808 a member of the Bureau des Longitudes; in 1809 professor in the Faculty of Sciences; member of the Institute in 1812, etc.; and this list of distinctions was crowned in 1837 by his elevation to the dignity of a peer of France. Poisson's whole life was devoted to the prosecution of scientific research, and the fruits of his pen number about 300 memoirs, inserted in the publications of the École Polytechnique, of the Academy of Sciences, and other scientific journals. Of the separate treatises published by Poisson, the best known is the "Treatise on Mechanics" (1833); others were on capillary action, the mathematical theory of heat, the motion of projectiles, and, lastly, the celebrated work "On the Invariability of the Mean Movement of the Planetary Axes." Poisson is fairly considered one of the chief founders of the science of mathematical physics. He died April 25, 1840.

Poitevin, Prosper, a French lexicographer and writer; born about 1804. He wrote: "Ali Pasha and Vasiliki," a poem (1833); and some comedies, among them "A Night at Potiphar's" (1841), "The Husband in Spite of Himself" (1842). His works on lexicography and linguistics are numerous; among them "Universal Dictionary of the French Language" (1854-1860), and "General and Historical Grammar of the French Language" (1856). He died in Paris, Oct. 27, 1884.

Poitiers, or Poictiers, a town of France, on the Clain, formerly capital of the province of Poitou, at present of the department of the Vienne. The town occupies a large space, the houses being often surrounded by gardens and orchards; the streets are narrow and ill paved. The principal edifice is the cathedral, founded by

Henry II. of England about 1162. Poitiers is one of the most ancient towns of France, and the vestiges of a Roman palace, of Roman baths, of an aqueduct, and an amphitheater still remain. Two famous battles were fought in its vicinity, that in which Charles Martel defeated the Saracen army in 732, and that between the French under their king John II., and the English under Edward the Black Prince in 1356. The manufactures are unimportant, but there is a large trade. Pop. (1906) 39,302.

Poitou, a former province of S. W. France, coincident with the present departments of Deux Sèvres, Vendée, and Vienne. It was divided into Upper and Lower Poitou, and had for its capital Poitiers. Its early history is the same as that of AQUITANIA (*q. v.*). Poitou became a possession of the English crown when Eleanor, Countess of Poitou and Duchess of Aquitaine, after her divorce from Louis VII. of France, married (1152) Henry of Anjou, afterward Henry I. of England. Philip Augustus reconquered the province in 1205. By the peace of Bretigny, in 1360, it again reverted to England, but nine years later was retaken by Charles V.

Poke. See GARGAT.

Poker, a game played with a full pack of cards, five being dealt, one at a time, to each player in rotation, beginning at the left of the dealer. The player winning the "pool," or "pot," always deals. An exposed card may be accepted or rejected; in the latter case it must be placed at the bottom of the pack. The cards rank in value as at WHIST (*q. v.*). The game admits of a number of players, from 2 to 10. At the commencement of the game, and whenever the "pot" shall have been "taken down," or won, a stated sum, or "ante," is put in the "pot" by each player. The very first rule of poker is to "ante up." In case of a misdeal, or in case of all "pass," then each player puts in another "ante," making a "double-header." This must be repeated as often as the case demands; so that there may be any number of "antes" in the same pot. Any player may shuffle the cards, the dealer having always the last shuffle. When the hands shall have been dealt, the players may, in rotation, beginning at the left of the dealer, "chip," meaning to put in the "pot" any sum he sees fit, which sum must be either met or overrun by any player wishing to "go in" for the "pot." In case a sum so "chipped" be overrun, the increase must be met by all having "chipped" a lesser sum, or they lose their interest in that "pot." A player not wishing to "chip" may pass, and meet, or not, the sums chipped on the second time round. Should he pass the second time, his claim on the "pot" ends. Those players chipping

Poker Pictures

equally, and the highest, when "called," show hands, the best hand "dragging down the pot." If one player bets more than any one else is willing to "see," or equal, he takes the "pot," without being obliged to show his hand. If one player puts in more money than another possesses, the one putting in all he has must have a "sight" for the amount invested up to the time of his running out of funds. When one player has put in all the money he has in his possession, and others wish to go on "bluffing," or betting, they must do it aside from the "pot" in which the party having no more money is interested. When the hands are shown, or "called," the best hand wins the sums respectively in which they have an interest. During the deal, any time before cards are seen, the player at the left of the dealer may put into the pot "a blind," being any sum he sees fit, which sum must be doubled by all who wish to enter for the pot. The player sitting next may "double the blind," and be doubled so upon by his left-hand adversary, till the "say" comes around to the dealer, and any may also "chip" as much as they see fit. The player sitting first, at the left of the dealer, has the privilege of starting "the blind."

Poker Pictures, imitations of pictures, or rather of bistre-washed drawing, executed by singeing the surface of white wood with a heated poker, such as used in Italian irons. They were extensively patronized in the 18th century.

Pokeweed, the *Phytolacca decandra*, a North American branching herbaceous plant, order *Phytolaccaceæ*, which is naturalized in some parts of Europe and Asia. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphiloid pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are sometimes eaten in the United States as asparagus.

Pol, Vincenty, a Polish poet; born in Lublin, Poland, April 20, 1807. He wrote the patriotic "Songs of Janusz" (1833); "Song of Our Country" (1843), which won for its author unbounded popularity; "Pictures from Life and from Travel" (1847), probably his finest work; "The Starost of Kisia" (1873), a narrative poem on the chase. He died in Cracow, Dec. 2, 1872.

Pola, the most important naval station of Austria-Hungary; situated near the S. extremity of the peninsula of Istria; 105 miles S. of Trieste. The harbor is thoroughly sheltered, deep, and spacious enough to accommodate the largest fleet. The town is protected by forts and batteries, and is

Poland

overlooked by the citadel, by which it and the bay are commanded. The arsenal employs about 2,400 men. There are also artillery and powder stores, docks, slips, etc. The cathedral dates from the 15th century. Pola is also a shipping port, exporting wood, fish, sand and building stones, and importing provisions, coal, and bricks. Founded traditionally by the Colchians who were sent in pursuit of Jason, Pola was destroyed by Augustus, but rebuilt at the request of his daughter Julia, on which account it was named Pietas Julia. At the beginning of the 3d century it had 30,000 inhabitants, and was a station of the Roman fleet. It was destroyed in 1267 by its Venetian masters, who had conquered it in 1148; and in 1379 the Genoese, after routing the Venetians in a sea fight off the town, once more ravaged it. But it only passed



AMPHITHEATER OF POLA.

from Venice in 1797 to Austria, who chose it as her chief naval harbor in 1848. It contains numerous interesting Roman remains, among them a well preserved amphitheater, 450 feet long and 360 broad. A temple and several ancient gates are also extant. Pop. (1909) 40,892.

Polabians, an ancient Slavic race, belonging to the same group as the Poles, occupying the basin of the Lower Elbe. They have long been Germanized, and their language is now extinct. The term is sometimes used in a wider sense for all Slavonic peoples W. and N. W. of the Oder and the Erzgebirge. See SLAVONIANS.

Polacre, a three-masted vessel used in the Mediterranean. The masts are usually of one piece, so that they have neither tops, caps, nor cross trees, nor horses to their upper yards.

Poland, once a large and important kingdom situated in the N. E. of Europe; now expunged from all maps as an independent country. It was bounded on the N. by the Baltic, S. by Wallachia, Moldavia, and Hungary, W. by Germany, and E. by Russia, and was the most level country in Europe, the Carpathian Mountains on the S. and W., as a boundary from Hungary, being the only mountain range of any height in the kingdom. The rivers of chief note are the Vistula, Bug, Niemen, Dwina, Dneiper, and Dneister, either flowing into the Baltic or the Euxine. The principal mineral products are iron, lead, gold, and silver, with salt, which last, from the abundance

Poland

of the yield, and the size and richness of the mines, was considered as the natural wealth of the country. The climate is extremely cold, humid, and unhealthy; the soil generally fertile, for though agriculture was always neglected, the yield of corn was enormous. Cattle and wheat are still the chief agricultural products. Poland was anciently divided into 12 provinces, each of which was governed by a chief, called a "Palatine." The Poles were originally a tribe of Vandals, whose history is quite unknown before the 6th century. About the year 750, the people, oppressed by their petty chiefs, were resolved to shake off the tyranny of their rulers, and elected a chief magistrate to govern them, under the title of duke. This state of things endured till the year 999, when reigning duke, Boleslaw, having made himself illustrious by his conquests and military genius, was dignified with the title of king by Otho III., Emperor of Germany. From which time the title became established in Poland, and, though the crown was elective, it often continued in the same family for many years, passing from father to son. From the 13th century, the Poles became the most warlike nation in Europe, and from the time when the Turks first crossed the Hellespont and settled in Greece, Poland was denominated the shield of Eastern Europe. In 1674, John Sobieski was advanced to the kingly dignity, and under him the Polish arms acquired a glory that eclipsed all other nations of that age. Sobieski formed a league with the Emperor Leopold, and when that monarch had been defeated, and his capital on the point of falling into the hands of the Turks, Sobieski advanced to Vienna, raised the siege, and, defeating the invaders, drove them back in rout to Constantinople. The war of succession that succeeded, between Charles XII. of Sweden and Frederic Augustus of Saxony, almost ruined the kingdom, and hastened its fatal end. Count Poniatowski who, in 1764, was elected to the throne by the name of Stanislaus Augustus, was the last King of Poland. Under this unfortunate sovereign, the country became the theater of a long and devastating war; the cities were pillaged, the country deluged by hosts of Cossacks and brutal Muscovite soldiery, and Poland in the end divided between Catherine of Russia, Joseph II., Emperor of Germany, and Frederic of Prussia. This shameful partition of an ancient nation, which drove Stanislaus in exile to France, was perpetrated in 1772. In 1795, a further dismemberment was effected between the three great powers, and the whole of Poland absorbed, except the ancient city of Cracow, with a few miles of adjacent country, which, elected into a free and independent State, was left to point to future ages where the once warlike nation of Po-

Polar Circles

land stood on the physical map of Europe. Of the three spoilers of Poland, Russia possesses the largest share of territory and population. Frequent insurrections have occurred. In 1830, a revolution took place, but ended in the surrender of Warsaw and the dispersion of the Poles. In 1832, what remained of Poland was declared a part of the Russian empire. In 1846, an attempt was made at Cracow to recover independence, but it ended in the subjugation of the last remnant of the country, which was annexed to Austria. In 1863, the Polish people, under the leadership of Langiewicz, made another abortive attempt to free their country from the Russian yoke. In 1864, Poland was deprived of its administrative independence, and in 1868 was incorporated absolutely with Russia; trial by jury was abolished and the use of the Polish language officially, (for signboards, railways, wills, etc.) was prohibited. There are two parties, the Nationalists and the Socialists, both opposed to the Russian government. Pop. (1909) 11,671,800.

Poland, John Scroggs, an American military officer; born in Princeton, Ind., Oct. 14, 1836; was graduated at the United States Military Academy and appointed a 2d lieutenant in 1861; served through the Civil War; was in the battles of Antietam, Fredericksburg, and Chancellorsville; was then assigned to the defenses of Washington; was assistant Professor of Geography, History, Ethics and Drawing at the United States Military Academy in 1865-1869; and was chief of the Department of Law at the United States Infantry and Cavalry School, Fort Leavenworth, Kan., in 1881-1886. At the beginning of the war with Spain (1898) he was commissioned a Brigadier-General of volunteers and commanded the 2d division, 1st Army Corps, stationed at Chickamauga Park, Ga. He wrote "Digest of the Military Laws of the United States from 1861 to 1868" (1868), and "The Conventions of Geneva of 1864 and 1868 and St. Petersburg International Commission" (1868). He died in Asheville, N. C., Aug. 8, 1898.

Polar Bear, *ursus maritimus*, the largest individual of the family *Ursidae*, and one of the best known. It is found over the whole of Greenland, but its numbers are decreasing, as it is regularly hunted for the sake of its skin, for which the Danish authorities give about 10 crowns (\$2.70) to the hunters on the spot. The polar bear is from seven to eight feet long, with a narrow head, and the forehead in a line with the elongated muzzle, short ears, and long neck. It is quite white when young, changing to a creamy tint in maturity. Unlike most of its congeners, it is carnivorous, attacks by biting, and only pregnant females hibernate.

Polar Circles, two imaginary circles of the earth parallel to the equator, the one

Polar Distance

N. and the other S., distant $23^{\circ} 28'$ from either pole.

Polar Distance, the angular distance of any point on a sphere from one of its poles; more especially, the angular distance of a heavenly body from the elevated pole of the heavens. It is measured by the intercepted arc of the circle passing through it and through the pole, or by the corresponding angle at the center of the sphere. According as the N. or S. pole is elevated we have the "north polar distance" or the "south polar distance."

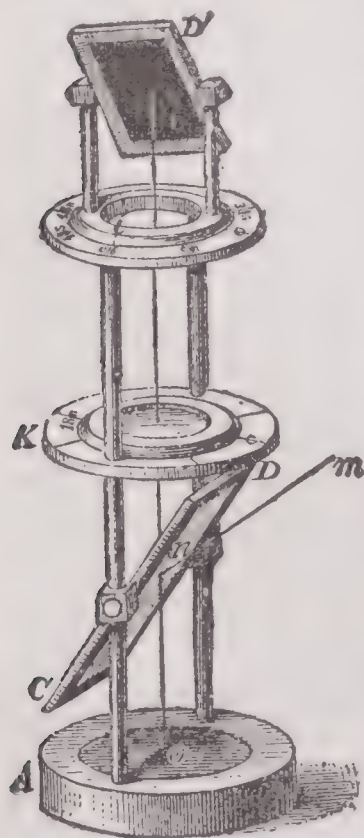
Polar Forces, in physics, forces that are developed and act in pairs with opposite tendencies, as in magnetism, electricity, etc.

Polariscope. See POLARIZATION.

Polarity, in physics, the disposition in a body, or an elementary molecule, to place its mathematical axis in a particular direction. Also, the disposition in a body to exhibit opposite or contrasted properties or powers in opposite or contrasted directions, specifically the existence of two points, called poles, possessing contrary tendencies. Examples, attraction and repulsion at the opposite ends of a magnet, opposite tendencies in polarized light, etc. In biology, Prof. Edward Forbes, considering that the relation between the palæozoic and neozoic life assemblages is one of development in opposite directions, called it polarity.

Polarization, the act of polarizing or of giving polarity to, the state of being polarized. In galvanism, the production of a secondary current in a galvanic battery contrary to the principal one, owing to the gradual chemical change in the elements of the battery. This change weakens, or may even destroy, the original current. Many forms of battery recover by rest; in others ingenious means are devised to avoid polarization, and such are called constant batteries.

Polarization of Light.—In optics, a state into which the ethereal undulations which cause the sensation of light are brought under certain conditions. These undulations are perpendicular to the line of transmission of the



POLARISCOPE.

A, base; D, polarizer; D', analyzer; K, graduated circle; m, n, light ray; n, o, polarized ray.

transmission of the wave, as in a stretched cord, but, in a ray

Polarization

of common light, appear to take place successively in all directions, the vibrations successively passing through rectilinear, elliptical, and circular phases with inconceivable rapidity. If, now, the vibrations become, or are rendered, stable in any one form of orbit, the light is in the condition known as polarized, and the state is one of plane, elliptical, or circular polarization. The most familiar and simple form is that of plane polarization. This may be produced in various ways, the piece of apparatus producing such modifications, being called a polarizer. When produced, however, the effects can only be perceived by examining them through another piece of apparatus which, used alone, would polarize the light, but when used to examine light already polarized, is called the analyzer. The two in combination, with the necessary adjustments, form a polariscope, of which there are many forms.

Plane Polarization.—When a ray of common light passes through a crystal (not of the cubic system), the atoms being so arranged that the elasticity (or other properties affecting motions of the ether within the crystal) are different in different directions, the ether motions are at once resolved into that of the greatest and the least elasticity at right angles to the path of the ray, so dividing the ray of common light into two "plane polarized" rays, polarized in planes at right angles to each other. One of these rays being easily eliminated by total reflection in the Nicol prism, two such prisms form a convenient polariscope. The ray, after passing through the first prism, appears just like common light, only of half the original brilliancy; but on looking at it through the second Nicol, on turning the latter round, we find two positions in which the light from the first Nicol gets through the second unaltered; and two positions at right angles to the former in which it is absolutely stopped, and the second prism, though clear as glass, is absolutely opaque to it. The beam of light appears thus to have acquired sides, and to behave differently according to the relation these sides bear to the position of the prism. Such is the fundamental nature and phenomenon of polarized light. Light is also polarized by reflection from polished transparent surfaces, when incident at such an angle that the reflected and refracted rays make a right angle. In glass, this angle is about 56° . An exactly equal quantity of the incident light which is transmitted through the glass is polarized in a plane at right angles to the former. At other angles the effect is partial. The scattered light of the sky is always more or less polarized, as is all light reflected from small particles in air or water, if the particles are small enough; the polarizing

Polarization

angle for such particles is, as might be expected, 45° .

Chromatic Polarization.—Let the perpendicular vibrations from a Nicol prism encounter in their path a crystalline film of selenite or mica, whose planes of greatest and least elasticity are arranged diagonally. The perpendicular vibrations are again “resolved” into two sets, one of which is retarded behind the other owing to the difference in the two elasticities. The analyzer “resolves” each of these again, bringing half of each set back into one plane. The two sets of waves are then in a position to exercise interference, and the consequence is that, if the plate or film is of suitable thickness, the most gorgeous colors are presented. It is the same with every substance having different elasticities in different directions, and as all “structure” presents such differences, polarized light becomes the most powerful weapon of the biologist, revealing structure where ordinary light will not do so.

Circular Polarization.—If two rectangular, equal impulses are given to a pendulum, or to a stretched cord, one of them a quarter-vibration later than the other, the two are compounded into a single circular orbit. Therefore, if a beam of plane-polarized light passes, as in the last paragraph, through a film of mica of such a thickness that one of the two diagonally vibrating sets of waves shall be retarded, while in the film one quarter-vibration behind the other, the two are compounded on emergence into one beam of circularly-polarized light. At approximate thicknesses, the light is elliptically polarized. Circularly polarized light is never stopped by the analyzer, but differs from common light in producing polarized effects. The most important of these is:

Rotatory Polarization.—Vary the former experiment by passing the light from the polarizing Nicol, with its vibrations in a vertical plane, through a plate of selenite or mica which gives fine color; the vibrations are then in the two diagonals. Let this light now traverse a “quarter-wave” mica film, with its polarizing planes perpendicular and horizontal. Each set of rays from the first plate becomes circularly polarized, but the two in opposite directions, the circular movements thus opposing each other. Whenever two circular motions thus meet, as in two circular pendulums clashing, the tangential motion is destroyed, and the pendulums would both fall back together through the center of the former orbit. It is so in this case; but as one set of rays has been retarded in the plates more than the other, the swing of the ether atoms is no longer in the original plane of vibration. If white light be employed, the many various wave lengths will

Polarized Rings

obviously meet at different points, and hence rotation of the analyzer will give in succession more or less of the colors of the spectrum. If the quarter-wave film is cut in half, and its position reversed in one-half, the transition of colors will occur in opposite orders in the two halves. Rotary polarization is of the greatest practical importance. There are many crystals, plates of which, when cut in proper directions, produce naturally all the phenomena of the double plate described above. Many fluids, such as oil of lemons, turpentine, and solution of cane sugar, also show the same phenomena very strongly, and in their case it is remarkably connected with the presence in the molecule of what chemists call “asymmetrical atoms.” In solutions, as of sugar, the amount of rotation is proportionate to the quantity of sugar in solution in a given column of fluid; hence the “estimation” of crystallizable sugar, whenever accuracy is required, is now always made by the polariscope. Faraday discovered, in 1845, that the property of rotary polarization was conferred upon any transparent body when the axis of the ray employed was made the axis of a galvanic solenoid or strong magnetic field.

Polarization of Heat.—The polarizing of rays of heat by reflection and by refraction.

Polarization of the Medium.—The name given by Faraday to the production of alternate layers of positive and negative electricity in the medium separating an electrified and an unelectrified body.

Polarized Rings. Imagine a crystal symmetrical around a single axis, like a section of the trunk of a tree, with the elasticity greatest or least in the direction of the axis, and symmetrically alike all round the circumference. If we cut a plate in the way of a plank, it will behave like the films already spoken of. But if a slice be cut across the trunk at right angles it must be different, when a ray of light passes through in the direction of the axis. The ether vibrations are at right angles to the path of the ray (now the same as the axis), but in all these directions the elasticity is equal, consequently a beam of common light will not be doubly-refracted, or a beam of plane polarized light further resolved, in passing along the axis. This is borne out by cutting a plate of calcite at right angles to its axis. But if the ray passes through such a plate obliquely, double refractions and interference will come into action, and we shall perceive color. Imagine now a conical, or strongly convergent pencil of plane-polarized light traversing the plate, and the analyzer turned so as to extinguish the light passing the polarizing Nicol. The center of the plate, where the beam is truly axial, will

Polder

still appear dark. But, as the light becomes more and more oblique, the vibrations will be resolved into some plane passing through the axis, and planes at right angles to these, or tangential planes.

In perpendicular and horizontal planes, these will cause no further resolution of the vibrations, and there will therefore be a black cross when the analyzer is crossed; but in all other planes, the more and more oblique light must cause successive rings of light and darkness, or, when white light is employed, of color. In crystals which are not perfectly symmetrical about one axis, the ideal structure may be compared to that of a tree trunk of an oval section. Here, a plank would still give two polarizing planes, as in a film of selenite; but a transverse section would also show two rectangular elasticities. In such a case, analysis proves that there must be two lines or axes inclined to each other, in which there can be no double refraction, and that the fringes of color must take the general shape of lemniscates. In many crystals the properties are quite different for light of different wave lengths, and in some the plane of the axes is at right angles for one end of the spectrum to what it is for the other. The relation of the elasticities may also be profoundly changed by heating the crystal, so that the intermediate one becomes greatest or least; in such cases, as in heating selenite, the double rings gradually merge into one and then the two rings spread out again in a direction at right angles to the former. Generally, it may be said that cubic crystals possess no double refraction; that crystals symmetrical round one axis are uniaxial, doubly refracting, and exhibit circular rings; and that other crystals are biaxial, and exhibit double rings. All these phenomena are of the greatest importance in the study of rocks, and the fragments of crystals imbedded in them.

Polder, in Holland and Belgium a tract of land below the level of the sea, or nearest river, which, being originally a morass or lake, has been drained and brought under cultivation.

Pole, in astronomy, one of the two points in which the axis of the earth is supposed to meet the sphere of the heavens; one of the fixed points about which the stars appear to revolve.

Pole, Perch, or Rod, a measure of length containing $16\frac{1}{2}$ feet or $5\frac{1}{2}$ yards. Sometimes the term is used as a superficial measure, a square pole denoting $5\frac{1}{2} \times 5\frac{1}{2}$ yards, or $30\frac{1}{4}$ square yards.

Pole, Magnetic. See MAGNETISM.

Pole, Reginald, Cardinal, a British statesman, and Archbishop of Canterbury in the reign of Queen Mary, descended from

Polecat

the blood royal of England; born in Stourton Castle, in Staffordshire, in 1500. He was educated at Sheen Monastery and Magdalen College, Oxford; and after obtaining preferment in the Church, went to Italy, where he long resided. During his residence there he became the friend of Bembo, Contarini, Caraffa, and Aloysius Priuli, the last named becoming his constant companion. On his return to England he opposed the divorce of Henry VIII. from Catherine of Aragon in such earnest terms, that the king drove him from his presence, and never saw him more. He again left England, was made a cardinal in December, 1536, and had the offer of the popedom on the death of Paul III. After he had left England Henry put to death his mother, and other members of his family, for corresponding with him. He found protection at Rome, was employed as nuncio, and was named president of the Council of Trent. When Mary ascended the throne, Pole returned to England as legate, in which capacity he absolved the Parliament from their sin of heresy, and reconciled the nation to the Holy See. The very day after the burning of Cranmer, the cardinal was consecrated Archbishop of Canterbury; soon after which he was elected chancellor of both universities, survived the queen but one day, and died Nov. 18, 1558. He was buried in Canterbury Cathedral, but his tomb has long lain neglected and scarcely distinguishable.

Pole, William, an English civil engineer; born in Birmingham, England, April 22, 1814. He was apprenticed to an engineer and engaged in gas work construction after his time expired. In 1844 he was appointed Professor of Civil Engineering at University College, London, and also lecturer at the Royal Engineers' establishment at Chatham. He was attached to several royal commissions as secretary. He wrote "Iron as a Material of Construction" (1872) and "The Status of Civil Engineers in the United Kingdom and Foreign Countries," etc. He died in London, Dec. 30, 1900.

Poleax, Poleaxe, or Pollax, a kind of ax or hatchet; a hatchet or ax with a long handle used for killing oxen, etc.; also a former military weapon which combined a hatchet, pike, and serrated hammer, much used by horse soldiers up to the 16th century. In nautical language, a heavy hatchet having a handle 15 inches long and a sharp point turning downward on the side opposite the blade. It is used for boarding, resisting boarders, cutting ropes or nettings, etc.; a boarding ax.

Polecat, the *putorius fætidus*, one of the Mustelinæ, akin to the marten, but with a broader head, a blunter snout, and a much shorter tail. It has a shorter neck and a

stouter body than the weasel. The shorter hairs are yellow and woolly, the longer ones black or brownish black and shining. Two glands near the root of the tail emit a highly offensive smell. It makes immense havoc in poultry yards, rabbit warrens, and



POLECAT.

among hares and partridges, killing everything which it can overpower. It also devours many eggs. Found in Arctic and temperate Europe.

Polemics, the art or practice of controversy or disputation; controversy; controversial writings, especially on matters of divinity or theology.

Polemoscope, a glass with a mirror at an angle of 45° , designed to enable a person to view objects not directly before the eye. It is used in opera glasses to view persons obliquely, without apparently directing the glass at them, and in field glasses for observing objects beyond an obstructing wall or bank, as in the interior of a fortress.

Pole Star, Polaris, a bright star at the tip of the tail of Ursa Minor, and in a line with the pointers Merak and Dubhe, the two stars constituting the front of the plowlike figure in Ursa Major. It is at present less than a degree and a half from the true pole, and by A. D. 2095, through the precession of the equinoxes, it will be under half a degree. Even now the circle it describes is too small to be discernible by the ordinary eye. The pole star is really a double star of yellow hue, but while the larger or visible one is between the second and third magnitude, its companion is only of the ninth, and therefore a telescopic star. There is no corresponding star in the Southern Hemisphere. The pole star is a convenient one for observing to determine the latitude and also the azimuthal error of any transit instrument.

Polenta, a preparation of either semolina, Indian corn, or chestnut meal, made into a porridge and variously flavored; a common article of diet in Italy and France. It is allowed to boil till it thickens, and is then poured into a dish, where it becomes firm enough to be cut into slices.

Polevói, Nikoláj Alexéjevitsh, a Russian novelist, dramatist, and literary

critic; born in Irkutsk, Russia, July 4, 1796. His dramatic compositions are "Ugolino," "Parasha," "Little Grandfather of the Russian Fleet"; they have a place in the repertoire of Russian theaters. He wrote also "History of the Russian People" (1829-1833). He died in St. Petersburg, March 6, 1846.

Polianthes, a genus of *Hemerocallæ*; the peduncle is two or three feet long, and has on its summit many cream colored flowers. *P. tuberosa* (tuberosa), a native of Mexico and South America, much cultivated in gardens in India, China, and Java, is deliciously fragrant, especially after dark, and during some thunderstorms its fading flowers emit electric sparks. The bulbs, dried and powdered, are given by the Hindus in gonorrhœa.

Police, a system of judicial and executive administration of a country, especially concerned with the maintenance of the quiet and good order of society; the means or system adopted by the authorities of a government, state, or community to maintain public order and liberty, and to protect property. In a more limited sense, the administration of the laws, by-laws, and regulations of a city. The primary objects of the police system are the prevention and detection of crime, and the preservation of peace and order, but various other duties have been from time to time added, as the prevention and removal of public nuisances and obstructions, the suppression of mendicancy, and the carrying into effect of the numerous laws and regulations made from time to time for the maintenance of public health, order, and safety.

Also properly an abbreviation of the term police force, *i. e.* a force for the maintenance of the public police or order, a civil force organized and maintained for the prevention and detection of crime, the preservation of public peace and order, and regulations of a city, township, or district. The ordinary police or a city are dressed in a particular uniform. The secret police, more commonly known as detectives, are not uniformed. The regulation and control of the police in a city are usually in the hands of the municipal authorities, and the cost of their maintenance is paid out of the local taxes.

Policy, a document containing a promise to pay a certain sum of money on the occurrence of some event. In return for this promise a sum of money is paid down, called the PREMIUM (*q. v.*). By far the largest part of insurance business is applied to disasters at sea; to destruction of property by fire; to making provision for heirs and successors in case of death, and to loss of time and expense through accident. The practice of insurance has also been ex-

tended to making provisions against loss of crops from bad weather, against destruction of glass from storms and accidents, etc. In every case a form is filled up containing a promise to pay a certain sum in the event of the happening of the specified contingency, and this document is always called the policy. Though an insurance policy is a contract, it is only signed by one party, the insurer, who for that reason is called the underwriter, and forms, therefore, what is called in law an unilateral contract. Marine policies are of two kinds (1) Valued policy, one in which the goods or property insured are at a specified value. (2) Open policy, one in which the value of the goods or property is not mentioned. In England a ticket or warrant for money in the public funds. Wager policies, wagering policies; policies containing the phrase, "interest or no interest," intended to signify insurance of property when no property is on board the ship. They are not recognized in law.

Polignac, an ancient French family, which claims to derive its name from a castle—the ancient Apolliniacum—in the department of Haute-Loire, and which since the 9th century possessed the district of Velay. Among its most famous members was CARDINAL MELCHOIR DE POLIGNAC (1661–1742), who was employed in diplomatic missions in Poland and at Rome, and received a cardinal's hat after acting as plenipotentiary of Louis XIV. at the peace of Utrecht (1712). From 1725 till 1732 he was French minister at the court of Rome, and he was appointed Archbishop of Auch. Polignac succeeded Bossuet at the French Academy in 1704, and left unfinished the "Anti-Lucretius" (1745), a poem intended for a refutation of Lucretius.

Some other members of the Polignac family are more notorious than noteworthy. In the reign of Louis XVI. Iolanthe-Martine Gabrielle de Polastron, Duchesse de Polignac (born 1749; died in Vienna, Dec. 3, 1793), and her husband, Jules Duc de Polignac (died in St. Petersburg, 1817), grand nephew of the cardinal, were among the worst, but unhappily most favored, advisers of Marie Antoinette. They obtained vast sums of the public money from their royal master and mistress, and were largely responsible for the shameful extravagance of the court. The Polignacs knew how they were hated, and were the first of the noblesse to emigrate. From the Empress Catharine of Russia the duke received an estate in the Ukraine, and did not return to France at the Restoration. His son, AUGUSTE JULES ARMAND MARIE, Prince de Polignac, was born in Versailles, May 14, 1780. On the Restoration he returned to

France; became intimate with the Comte d'Artois, afterward Charles X.; from his devotion to the policy of Rome received from the Pope in 1820 the title prince; was appointed ambassador at the English court in 1823; and finally, in 1829, became head of the last Bourbon ministry, in which capacity he promulgated the fatal ordonnances that cost Charles X. his throne. He then attempted to flee, but was captured at Granville on Aug. 15, was tried, and condemned to imprisonment for life in the castle of Ham, but was set at liberty by the amnesty of 1836. He took up his residence in England, but died in St. Germain, March 2, 1847. His son, Prince Armand, (1817–1890), was a leading monarchist.

Polishing, the name given to the process by which the surface of a material is made to assume a perfectly smooth and glossy appearance, usually by friction. The article to be polished must first be made smooth and even, after which the polishing begins. In the case of wood the process is commonly effected by rubbing with French polish. In metals, by polishing steel or blood-stone, or by wood covered over with leather, and on which pulverized tripoli, chalk, tin-putty, etc., is sprinkled. In glass and precious stones, by tin-putty and lead siftings; in marble, by tin-putty and tripoli; in granite and other hard stones, by tripoli and quicklime.

Polishing Powder, pulverized material used in polishing. Diamond, sapphire, ruby, corundum, emery, rotten stone, flint, tripoli, pumice stone, oxide of iron, and chalk are all employed. The first three are used by the lapidary; corundum and emery principally by metal workers.

Polishing Slate, a slaty rock occurring mostly in beds of the Tertiary formation. Texture, earthy; soft; friable. It consists of the siliceous shells or envelopes of various species of Diatomaceæ, the number contained in a cubic inch having been reckoned to be about 41,000,000,000.

Political Changes of the Century. When the 19th century opened, the Napoleonic wars had already begun, the wars which changed the boundaries of European States almost daily, and which finally left their permanent impress on the map of Europe. In the settlement that followed the downfall of Napoleon, and by which the status of European States was fixed for almost half a century, all the important States except France gained considerable territorial accessions. Prussia annexed the Rhine province, Westphalia, and the province of Saxony. Russia secured the lion's share of Poland and the grand-duchy of Finland. England fell heir to the Dutch colonies of Ceylon and the Cape of Good Hope, while Austria established her

overlordship in the Italian provinces of Venetia and Lombardy. Belgium and Holland were temporarily united, and the German States formed a lax confederation which took the place of the Holy Roman empire destroyed by Napoleon in 1806. In making this settlement, the Congress of Vienna followed the diplomatic methods of the 18th century. It represented governments, not peoples, and hence there was no thought of consulting the needs and predilections of the people. The sole aim was to secure a mechanical balance between the States and to allow no State to grow unless compensation could be made to its powerful rivals. This system, which is identified with the name of Metternich, preserved the peace of Europe for 40 years, but it brought the peace of death and the quiet of the prison walls. The aspirations and ideals of the French Revolution were put under the ban. In internal government the old régime of absolute monarchy was restored. Alexander I. of Russia, who had given Poland a liberal constitution, and who in general favored reform, soon became reactionary under the influence of Metternich, whose sole principle of political action was "the preservation of every legally existing institution." The true political history of the 19th century is the struggle of liberalism and nationalism to assert themselves against the dead weight of this reactionary régime.

The 19th century had become the age of nationalism, where everything was subordinated to the welfare and growth of the national State, which is considered the highest expression of civilization. How can we explain this development? How account for the power which this idea has exercised in the immediate past? All the dynastic interests at the beginning of that century were hostile to it. They clung to the system of balance of power, by which all broader aspirations were to be kept down. Provinces were married and exchanged and whole populations were bartered without a thought of their convenience. Of this policy Austria was the chief representative. For centuries her reigning house had pursued the policy of enriching itself, with a true disregard of all historical fitness. It made not the least difference whether the dowried princess lived in Spain, Italy, or Germany; she was married with her lands to the scion of the Hapsburg house. Thus instead of building up a strong national State like England or France, Austria created simply an agglomeration of jarring nationalities; and it remained the policy of her court to stifle every aspiration for national political existence by her subject peoples. But it was not only the interest of the courts and the diplomats that was hostile to nationalism. The whole spirit of the times

was rather cosmopolitan and humanitarian than national. The belief in a general culture, in a common destiny of humanity, in the progress of the human race toward a millennium of universal brotherhood—these were the constituent elements of the intellectual atmosphere of the time. Like Byron and Goethe, most cultured men considered themselves citizens of the world rather than of a particular state. When thus apparently everything was opposed to the national idea, to what shall we attribute its growing strength and ultimate triumph? We may say that the tendency of history for the last 500 years has been toward nationalism, away from the world-state idea of the Middle Ages; but how did individual men in the first half of the 19th century become conscious of this movement, and enthusiastic for it, away from the cosmopolitan apathy and the dynastic interests that would have prevented its realization?

This change in the minds of men is undoubtedly a result of the career and policy of Napoleon. By bringing the most incompatible elements together, by subjecting civilized peoples to the dominion of hated strangers, he led men to feel the necessity of national political unity and power, and thus aroused against his imperial policy a patriotic enthusiasm which became strong enough to wreck his career. The experience of the great German philosopher, Fichte, is typical in this respect. He had been a thoroughgoing humanist, enthusiastic for the ideals of the French Revolution; but when the cohorts of Napoleon swept his native land, when the conqueror's army marched through his peaceful little Jena, he began to feel that the first need of life was a strong fatherland; and in his "Addresses to the German Nation" he became one of the first to stir up national patriotism. One of the results of the Napoleonic wars was the acquisition by Austria of some Italian provinces. Here, too, the domination of the stranger led to a burning desire for national strength and unity; and the Austrian oppression fired the courage and spirit of the Italian patriots. The other great political force of the century, liberalism, though entirely distinct from nationalism, is often found in connection with it; it is often the reverse of the coin. A nation, to be strong and unified, needs a national consciousness, which best finds expression in a parliament and in the general participation of the people in political life. Self-government and the absence of a paternal administration are the core of the liberal system. It will be noted that when nations have fully developed they turn gradually away from the classic liberalism, as we see today, but during the middle period of the century these two great political forces in general worked to-

gether — nationalism and liberalism. On the European continent the reaction was at its darkest during the twenties, when under Canning's leadership the dead pall was already being lifted in England. Alexander I. had become frightened at liberal agitation, and when in 1819 his agent, the writer Kotzebue, was murdered by students, it was easy for Metternich to persuade him of the dangerous character of liberalism. The Holy Alliance in which Alexander was the leading spirit, therefore came to stand for everything that is dark and reactionary in politics. Not only in their own States were the monarchies anxious to suppress all freedom, but they were even ready to intervene in the affairs of other nations for the purposes of stifling nascent liberal agitation. Thus the Spanish colonies, which had revolted against their mother country, were to be reduced to obedience, and but for the promulgation of the Monroe Doctrine in 1823 and the diplomacy of Canning this would surely have been accomplished.

The first triumph won by nationalism in Europe was the independence of the Greeks. Canning recognized them as belligerents as early as 1823. Russia, to gain influence in the Orient, took up their cause, and in 1829 the kingdom of Greece was established. But all this was too far away from the center of European affairs to have much influence upon them. The policy there remained intensely reactionary. In Prussia, Hegel's philosophy which canonizes the existing order, became the philosophy of the State, while Austria had the most rigid and unbearable system of censure and religious disabilities that could be devised. It was France that saw the first open revolt against this policy of darkness. The effort of Charles X. to do away with the last remnant of the constitutional order led to the July revolution of 1830. The government, which was then established with the "Citizen King" Louis Philippe at its head and Guizot as its leading spirit, was, however, liberal only in name. It was thoroughly Whiggish, represented only the great property holders, the upper middle class, and it held its power by a lavish use of corruption. No wonder that in the midst of apparent prosperity it suddenly broke down in 1848 when no one was expecting a radical change. In France the revolution of 1830 was a liberal movement. In other parts of Europe it was national. Belgium severed its connection with Holland, and unhappy Poland made a frantic effort to gain its independence, but it was unsuccessful, and it was punished by the loss of the Polish constitution which had been granted in 1815. The next revolutionary movement, that of 1848, also had a mixed liberal and national character. Under the leadership of Kossuth, the Hungarians es-

tablished a short-lived independent national government. The Slavic population of Austria made a similar attempt. In Italy insurrections took place in Venice and Lombardy against Austria, and in the Papal States against the authority of the Pope. In Prussia the king, the weak and gentle Frederick William IV., was prevailed upon to promise a national assembly, which ended by offering the imperial German crown to him, thus anticipating history by two decades. In France the revolution was begun by the Liberal Republicans, but already on the second day the Socialists, who had been quietly growing in numbers during the last decade, seized the power under the leadership of Louis Blanc. Subsequently Liberals and Socialists neutralized each other so that Napoleon III. could make his rapid ascent from the presidency to the imperial throne. In general the revolution, both from a liberal and a national standpoint, was unsuccessful everywhere, and reaction again was temporarily victorious. This led to an unprecedented age of pessimism. The dearest hopes of the youth of Europe had been disappointed. The men who had the noblest and broadest aspirations were discredited or were seeking refuge in foreign lands. No wonder that the age turned to the dark philosophy of Schopenhauer and to the gloomy contemplation of realism in art. Nationalism was still only a popular movement; the governments had not as yet taken up its cause. They were arrayed against it, and for the time being it suffered defeat.

During the next two decades, however, nationalism became the avowed principle of action in the political world. The growth of nations, the cementing of national unity, the fostering of national life, became the first care of statesmen. Germany, Italy, and Hungary gained political unity and existence, and in the United States the attacks upon nationalism were beaten down in the bloody Civil War. The Crimean War of 1855, caused by Russian ambition in the Orient, led eventually to the establishment of a number of national States in the Balkans. In 1861 Moldavia and Wallachia united as a nation under the name of Rumania. In 1875 Bosnia revolted against Turkish authority. The consequent unrest brought on the Bulgarian massacres, which led to Russian intervention and the war of 1877. In the peace of San Stefano of 1878 Russia practically decreed the dissolution of the Turkish empire, but her ambitions were curbed and her policy defeated by the Congress of Berlin. Montenegro, Servia, and Rumania were declared independent States. Bulgaria and East Rumelia were given virtual self-government, with a nominal dependence on Turkey. Bosnia was placed under the protectorate of Austria, while Russia was given some unimportant terri-

tory in Asia Minor. Throughout these developments the national principle was constantly invoked, both within these new States and among the diplomats that settled their destiny. We need only recapitulate the events in Central Europe to show the growth of nationalism was the matter about which everything turned at this time. In Hungary the ancient constitution had been abolished in 1849, the Austrian government having been supported by Russian intervention in the arduous task of suppressing the patriotic revolt; but after the Austro-Prussian War in 1867 Hungary became an independent kingdom with a completely guaranteed constitution. The *dénoûement* of the German drama of nationalism was as rapid as it was unexpected. In 1864 Austria and Prussia had fought side by side against Denmark for the duchy of Schleswig-Holstein; but in 1866 the strong Prussian national State turned against the old enemy of nationalism, defeated the armies of Austria, and forced that State out of the German confederation, in which it had been the reactionary element. The presidency of the North German Confederation was now united with the crown of Prussia. It needed only the war of 1870 against the hereditary enemy of Germany to bring into strong relief the new national patriotism, and to unite the North German States in a national empire.

In Italy nationalism found sustenance and nourished its flame in opposition to the dominion of the stranger; but it was also the assistance of the stranger that aided her in vindicating her independence. In 1859 Napoleon III. assisted the monarchy of Sardinia in gaining Lombardy, and caused himself to be remunerated by the two provinces of Savoy and Nice. The following year Garibaldi undertook his patriotic expedition into Sicily and Neapolitan territory, leading to the annexation of these as well as the Papal States and the formation of the kingdom of Italy with Florence as its capital in 1861. In 1866 Italy, as the ally of Prussia, though defeated by land and sea, gained Venice and obtained recognition as the sixth of the great European powers. The work was completed in 1871, when the French garrison left Rome and the Eternal City became the capital of Italy. In all these countries the struggle was bloody, but nowhere more tragic than in the United States, where it took a terrible war of four years to settle the supremacy of the national idea. While the idea of nationalism was bringing long separated populations together into political union and molding the outward form of States, the force of liberalism was potent in their inner life. This is a broad term, and covers many shades of political theory, from an aristocratic exclusiveness to a broad and progressive democracy. But all these tend-

encies are the outgrowth of the French Revolution, and all more or less conform to a certain type of theory which we may call the classic liberalism. Its distinctive feature is the limitation of State power, the idea of *laissez faire*. It seeks political virtue in governmental machinery, in parliaments, in the extension of the suffrage, in opposition to purely hereditary rights. It lays special stress on the organs of public opinion, and has an optimistic belief in the power of reason and rational discussion in political life.

Even Russia could not escape the influence of these ideas, which were potent in bringing about the liberation of the serfs in 1863, and the encouragement of self-government in the *mir*. In Greece a liberal constitution was promulgated as early as 1844. Austria, after the darkness of reaction which followed the revolution of 1848, adopted a liberal constitution in 1861, and totally reorganized her government in 1867. The Italian monarchy and the house of Savoy have been animated with liberal principles from the first. Though in France all political life was stifled during the earlier years of the empire, still later in the sixties, especially just before the Franco-Prussian War, a liberal policy had again been adopted. The nationalists of Germany, like Bismarck, the statesman, and Treitschke, the historian, always insisted that liberal government was impossible as long as the many particularistic States of Germany were suffered to continue, and that for the establishment of a liberal government national unity was essential. Bismarck, however, placed nationalism first, and when, as in his struggle with the Parliament in the sixties, its needs conflicted with liberal principles, the latter had to give way.

England was during this period the country of liberalism *par excellence*. Having established her national existence and unity centuries before, she could concentrate her whole attention on the rational ordering of her domestic affairs, and the serene reign of liberalism, of which John Bright and Gladstone were the leading spirits, was not obscured for a long time by any irruptions of nationalist propaganda. The thought of the age was given to structural reform, to extension of the suffrage, disestablishment, change of the constitutional relations between Ireland and England, and a reformation of the House of Lords.

During this whole period, in England as well as on the Continent, colonies were undervalued. So intense was the struggle for the recognition of nationalism on the Continent, so deeply were the English statesmen interested in questions of domestic polity and liberal reform that no attention and energy remained to be expended on distant possessions. The liberal idea of self-government postulated that colonies

should be made independent as soon as possible. The example of the United States seemed to indicate that this would be the natural course of development. The chief duty of the mother country was therefore to prepare her dependencies for the inevitable separation, and not to forfeit their good graces by a harsh and imperious dominion. Where trade was universally free, where men were animated by the peaceful sentiments of an industrial age, political empire seemed of little importance. All the great leaders of the Liberal party up to the seventies discouraged expenditure for the colonies, and seemed to regard the impending separation as a matter of course; while even Disraeli spoke of the colonies as a mere burden, as "a millstone around our neck."

With the seventies a great change began to come over the political world. The national element in politics, now fully recognized and established in power, superseded the older liberalism. Structural ideas of politics grew uninteresting and unimportant. Effort and attention were concentrated on the development of national force without and within, and on the solution of social questions by legislation. Men no longer asked how the government was to be composed, but how was it to be used for the accomplishment of the various national purposes. As a source of national strength attention was soon directed to colonies. Great Britain recognized their value, and the continental nations looked longingly and jealously at her magnificent empire. There began a race for territorial acquisition which seems to have come to a climax in our own day. The accompanying table will show how rapidly the imperial domains have expanded in the last 30 years:

AREA IN SQUARE MILES OF THE EXTRA-EUROPEAN POSSESSIONS OF EUROPEAN POWERS.

Name of Country.	Year 1765	Year 1800	Year 1850	Year 1870	Year 1900
Great Britain....	1,510,329	1,042,595	4,265,853	7,906,261	12,151,000
France	1,056,726	1,056,726	698,905	784,125	3,638,755
Germany					1,023,840
Russia	5,018,127	5,018,127	5,106,724	5,895,028	6,438,682

AREA OF THE UNITED STATES AND POSSESSIONS.

	Year 1800	Year 1850	Year 1870	Year 1900
	815,244	3,057,407	3,602,990	3,768,521

The purpose of British colonial policy is not merely to acquire new territory, but to bind together the different parts of the empire by the firmest ties, both physical and ideal. Thus a vast railroad is planned from Cairo to India as an industrial back-

bone to the British empire in Africa and Asia, and the integrity of this connection was one of the prime motives that led to the recent Boer war. In other parts of the world—in Canada and Australia—the bonds of racial affinity are used for purposes of imperial federation. France has been animated with a feverish desire to accumulate territory in order to conceal her inner decay by the outward splendor and extent of her possessions. Germany, on the other hand, makes imperialism the agent of the expansion of her commerce, seeking chiefly for *points d'appui* which will assure for her the safety of trade routes.

Russia and the United States show a strange parallel of development. Up to very recent times they acquired new territories for their expanding population. They conquered nature, and from icy Siberia and the plains that stretch toward the Rocky mountains they brought forth wealth and created well-being for millions. Now their manner of expansion has changed. The United States has come into possession of territory which can never be permanently settled by her citizens, while the empire of the North seems desirous to change her ancient character as conqueror over the forces of nature to that of conqueror of men.

It is not here suitable to enter more fully into the consequences to politics and civilization of these later developments. To many they contain the foreboding of a great struggle for world supremacy. But it must be said that so far the idea of world empire cannot be considered a part of practical politics. The great powers are at present struggling not for supremacy, but for their share in the wealth and territory of the globe, in the influence that molds the destiny of humanity.

Just now, however, at the meeting of two centuries, in the Orient there looms up with portentous significance the problem of China, and it may perhaps be said without exaggeration that the fate of mankind is closely interwoven with that of the Chinese empire at the present time. Should any one power gain the absolute ascendancy in the far

Orient, which on account of its resources and the aptitudes of its inhabitants is bound to become the center of industry for the future, such an outcome would be fraught with the gravest dangers for humanity. The balance which enables several

nations to develop their individuality side by side would be destroyed, and we should be brought one long step nearer to the condition of world uniformity where all national characteristics are suppressed, or become indistinguishable in a common type. But we need not deal with these possibilities. So far the temper among the nations, though they are engaged in a fierce competition, is still one of mutual respect and forbearance, and there certainly is work for all the civilized powers in the regeneration of the oldest parts of the world and the civilization of its barbarous regions.

PAUL S. REINSCH.

Political Economy, the science which investigates the nature of wealth and the laws of its production and distribution, including the operation of causes by which the condition of mankind in respect to this object of human desire, is made prosperous or the reverse. Inquiries on these points must have existed from the earliest times in every nation, but political economy as a science is very modern. Crude views on the subject arose in the Middle Ages, in the free Italian cities and the Hanseatic towns. Sir Walter Raleigh (1595), Sir William Petty (1667), and Sir Dudley North (1691) wrote on the subject with enlightenment for their age. François Quesney, in France (1786), founded the school of the economists which held that the soil is the source of all wealth. Adam Smith (1723-1790) had made political economy a portion of his lectures while professor in Glasgow University from 1751 to 1764. Visiting Paris in that year, he became acquainted with Quesnay and the leading economists, but the principles of his great work, the "Wealth of Nations," published after 10 years' retirement, in 1776, were in the main, thought out independently. Since Adam Smith's time, no work on the subject has appeared more original or influential than the "Principles of Political Economy," by John Stuart Mill. In this and his other productions advocating liberty, he yet considers that public opinion and, if need be, even law should be directed against the increase of population when there is no hope of comfortable, or at least of decent, maintenance, and that the unearned increment of land should be appropriated by the state. This latter view the late Professor Fawcett, another eminent political economist, strongly controverted. Probably the most notable political economist of the latter part of the century was Henry George, of New York city, whose views, to some extent, coincide with those of J. S. Mill, especially as regards the unearned increment of the land. Mr. George's theory has been popularly denominated the single tax idea, and is best set forth in his work, "Progress and Poverty."

Political Issues in the United States. My review will begin with the year 1856 —

the year of my graduation and that in which I cast my first vote; also one in which a President was chosen, James Buchanan being the successful candidate. But it must be premised that each election does not represent a debate; not infrequently it is merely a stage in a debate. It was so in 1856; it has been so several times since. Indeed, since 1840 — the famous "Log Cabin and Hard Cider" campaign of "Coon-Skin Caps," and "Tippecanoe and Tyler too," probably the most humorous, not to say grotesque, episode in our whole national history, that in which the plane of discussion reached its lowest recorded level — since 1840 there have been only six real debates, the average period of a debate being therefore 10 years. These debates were (1) that over slavery, from 1844 to 1864; (2) that over reconstruction, from 1868 to 1872; (3) legal tenders, or "fiat money," and resumption of specie payments were the issues in 1876 and 1880; (4) the issue of 1888 and 1892 was over protection and free trade; (5) the debate over bimetallism and the demonetization of silver occurred in 1896; and, finally (6), imperialism, as it is called, came to the front in 1900. Since 1856, therefore, the field of discussion has been wide and diversified, presenting several issues of great moment. Of necessity also the debates have assumed many and diverse aspects, ethnical, ethnological, legal, military, economical, financial, historical. The last is that which interests us.

Slavery Issue.—The first of the debates I have enumerated, that involving the slavery issue, is now far removed. We can pass on it historically; for the young man who threw his maiden vote in 1860, when it came to its close, is now nearing his grand climacteric. Of all the debates in our national history that was the longest, the most elevated, the most momentous, and the best sustained. It looms up in memory; it projects itself from history. As a whole, it was immensely creditable to the people, the community at large, for whose instruction it was conducted. It has left a literature of its own, economical, legal, moral, political, imaginative. So far as the historical aspect of that great debate is concerned, two things are to be specially noted. In the first place the moral and economical aspects predominated; and, in the second place, what may be called the historical element as an influencing factor was then in its infancy. The slavery debate was so long and intense that all the forces then existing were drawn into it. The pulpit, for instance, participated actively. The physiologist was much concerned over ethnological problems, trying to decide whether the African was a human being or an animal; and, if the former, was he of the family of Cain. Thus all contributed to the discussion; and yet I am unable to point out any

distinctly historical contribution of a high order; though on both sides the issue was discussed historically with intelligence and research. Especially was this the case in the arguments made before the courts and in the Scriptural dissertations; while on the political side the speeches of Seward and Sumner, of Jefferson Davis and A. H. Stephens, leave little to be desired. The climax was perhaps reached in the memorable joint debate between Lincoln and Douglas, of which it is not too much to say the country was the auditory.

Beginning in its closing stage, in December, 1853, when the measure repealing the Missouri compromise of 1820 was introduced into the Senate of the United States, and closing in December, 1860, with the passage of its ordinance of secession by South Carolina, this debate was continuous for seven years, covering two presidential elections, those of 1856 and 1860. Of the great slavery debate it may then in fine be said that, while the study of history and the lessons to be deduced from history contributed not much to it, it made history, and on history has left a permanent mark. Of the canvass of 1864, from our point of view little need be said. There was in it no great field for the historical investigator, the issue then presented to the people being of a character altogether exceptional. The result depended less on argument than on the outcome of operations in the field. Nor was it greatly otherwise in the canvass of 1868. The country was then stirred to its very depths over the questions growing out of the war. The shattered Union was to be reconstructed; the slave system was to be eradicated. These were great political problems; problems as pressing as they were momentous. For their proper solution it was above all else necessary that they should be approached in a calm scholarly spirit, observant of the teachings of history. Never was there a greater occasion; rarely has one been so completely lost. The assassination of Lincoln silenced reason; and to reason and to reason only does history make its appeal. The unfortunate personality of Andrew Johnson now intruded itself; and, almost at once, what should have been a calm debate degenerated into a furious wrangle. Looking back over the canvass of 1868, and excepting General Grant's singularly felicitous closing of his brief letter of acceptance—"Let us have peace"—I think it would be difficult for anyone to recall a single utterance which produced any lasting impression.

Reconstruction.—The debate over reconstruction, begun in 1865, did not wear itself out till 1876. In no respect will it bear comparison with the debate over slavery which preceded it. Sufficiently momentous, it was less sustained, less thorough, far less judicial. Toward its close, moreover,

as the country wearied, it was gravely complicated by a new issue; for, in 1867, began that currency discussion destined to last in its various phases through the lifetime of a generation. It thereafter entered in greater or less degree into no less than nine consecutive presidential elections, two of which, those of 1876 and 1896, actually turned on it.

Currency Issue.—The currency debate presented three distinct phases: first, the proposition, broached in 1867, known as the greenback theory, under which the interest bearing bonds of the United States, issued during the Civil War, were to be paid at maturity in United States legal tender notes, bearing no interest at all. This somewhat amazing proposition was speedily disposed of; for early in 1869 an act was passed declaring the bonds payable "in coin." But, as was sure to be the case, the so-called "fiat money" delusion had obtained a firm lodgment in the minds of a large part of the community, and to drive it out was the work of time. It assumed too, all sorts of aspects. Dispelled in one form, it appeared in another.

It is difficult to say what the dividing issue of 1876 really was. The country was then slowly recovering from the business prostration which followed the collapse of 1873. The living debate was over material questions, the cause of the prolonged business depression and the remedy for it. The favorite specific was at first a recourse to paper money. The government printing press was to be set in motion in place of the mint; and even hard-money Democrats of the Jacksonian school united with radical Republicans of the reconstruction period in guaranteeing a resultant prosperity. Again the teachings of history were ignored. What, it was contemptuously exclaimed in the Senate, do we care for "abroad!" From this calamity the country had been saved by the veto of President Grant in 1874; and the following year an act was passed looking to the resumption of specie payments on the 1st of January, 1879. Seventeen years of suspension were then to close. Over this measure the parties nominally joined issue in 1876. The Republicans, nominating Governor Hayes of Ohio, demanded the fulfilment of the promise; the Democrats, nominating Governor Tilden of New York, insisted on the repeal of the law. Yet it was well understood that the candidate of the Democracy favored the policy of which the law in debate was the concrete expression. The contest was thus in reality one between the "ins" and the "outs."

But not the less for that, in the canvass of 1876 a field of great political usefulness was opened up to the historical investigator; a field which, I submit, he failed adequately to develop. A public duty was left

unperformed. From time immemorial to tamper with the established measures of value has been the constant practice of men of restless and unstable mind, honest or dishonest, whether rulers or aspirants to rule.

The Tariff Issue.—The administration of President Hayes was curiously epochal. During it the so-called "carpet-bag governments" disappeared from the Southern States; the country resumed payments in specie; and on Feb. 28, 1878, Congress passed over the veto of the President an act renewing the coinage of silver dollars, the stoppage of which, five years before, constituted what was destined thereafter to be referred to as "the crime of 1873." This issue, however, matured slowly. Public men, having recourse to palliatives, temporized with it; and through four presidential elections it lay dormant, except in so far as parties pledged themselves to action calculated, in the well-nigh idiotic formula of politicians, to "do something for silver." The canvasses of 1880 and 1884 are therefore devoid of historical interest. The first turned largely on the tariff; and yet, curiously enough, the single utterance in that debate which has left a mark on the public memory was the wonderful dictum of General Hancock, the candidate of the defeated opposition, that the tariff was a local issue, which a number of years before had excited a good deal of interest in his native State of Pennsylvania. Nor is the recollection of the debate of 1884 much more inspiring. It was a lively contest enough, under Grover Cleveland and James G. Blaine as opposing candidates, a struggle between the "outs" to get in and the "ins" not to go out. But a single formula connected with it comes echoing down the corridors of time, the alliterative "Rum, Romanism, and Rebellion" of the unfortunate Burchard.

That of 1888, presenting at last an issue, rose to the dignity of debate. In his annual message of the previous December the President, in disregard of all precedent had confined his attention not only to the tariff, but to a single feature in the tariff, the duty on wool. In so doing he had, as the well understood candidate of his party for reelection, flung down the gauntlet, for only three years before the Republicans, in the presidential platform, had laid particular emphasis on "the importance of sheep industry" and "the danger threatening its future prosperity." They had thus pledged themselves to "do something" for wool, as well as for silver, and the President now struck at wool as "the tariff-arch keystone." But, while in this debate the economist came to the front, there was no pronounced call, and, indeed, small opportunity for the historian.

Three Great Issues.—Returning to the review of our national debates, we find that in 1892 the shadow of coming events was plainly perceptible. The tariff issue had now lost its old significance; for the infant industries had developed into trade and legislation-compelling trusts. These were suggestive of new and, as yet, inchoate problems; but to them the constituency was not prepared intelligently to address itself. Populism was rife, with its crude and restless theories; a crisis in the history of the precious metals was clearly impending with the outcome in doubt; indiscriminate and unprecedented pension-giving had reduced an overflowing exchequer to the verge of bankruptcy. The debate of 1892 accordingly dropped back to the politician's level, that of 1876, 1880, and 1884.

Of quite another character were the two canvasses of 1896 and 1900. Still fresh in memory, the echoes of these have indeed not yet ceased to reverberate; and I assert without hesitation that not since 1856 and 1860 has this people passed through two such wholesome and educational experiences. In 1896 and in 1900, as in the debates of 40 years previous, there was a place, and a larger place, for the student, whether investigator or philosopher. Great problems, problems of law, of economics and ethics, problems involving peace and war, and the course of development in the oldest as in the newest civilizations, had to be discussed on the way to a solution. That the prolonged debate running through those eight years was at all equal to the occasion I do not think can be claimed. Even his most ardent admirers will hardly suggest that Mr. Bryan in 1896 and 1900 rose to the level reached by Lincoln 40 years before, nor do the utterances of Mr. Roosevelt, Mr. Depew, or Mr. Hanna bear well a comparison with those of Seward, Trumbull, and Sumner. Indeed, in the whole wordy canvass of 1896 I now recall but two instances of the professor or philosopher distinctively taking the floor; but both of those were memorable. They imparted an elevation of tone to discussion, immediately and distinctly perceptible, in the press and on the platform. I refer to the single utterance of Carl Schurz before a small audience at Chicago on Sept. 5, 1896, and to the subsequent publications of President Andrew D. White, in which, from his library at Ithaca, he drew freely on the stores of historical experience in crushing refutation of demagogical campaign sophistry.

What were the issues of the last presidential canvass? On what questions did its debate turn? Three in number, they were, I think, singularly inviting to those historically minded. To the reflecting man the matter first in importance was what is known as "imperial-

ism," the problem forced on our consideration by the outcome of the war with Spain. Next I should place the questions of public policy involved in the rapid agglomerations of capital, popularly denominated trusts. Finally, the silver issue still lingered at the front, a legacy from the canvass of four years previous. The debate of 1900 is a thing of the past. Each of those issues can now be discussed, as it might well then have been discussed, in the pure historical spirit. Let us take them up in their inverse order.

Silver and Trusts.—Shortly after 1870 the policy of demonetizing silver was entered on; and in 1873 the United States gave its adhesion to that policy. Thereafter, in the great system of international exchanges, silver ceased to be counted a part of that specie reserve on which drafts were made. Thenceforth the drain, as among the financial centers, was to be on gold alone. In the whole history of man no precedent for such a step was to be found. So far as the United States was concerned the basis on which its complex and delicate financial fabric rested was weakened by one-half; and the cheaper and more accessible metal, that to which the debtor would naturally have recourse in discharge of his obligations, was made unavailable. It could further be demonstrated that without a complete readjustment of our currencies and values the world's accumulated stock and annual production of gold could not, as a monetary basis, be made to suffice for its needs. A continually recurring contest for gold among the greatest financial centers was inevitable. "A change which," in the language of Lecky, "beyond all others affects most deeply and universally the material well-being of man had been unwittingly challenged." The only question was, Would the unexpected occur? Then, if it did occur, what might be anticipated? Such was the silver issue, as it presented itself in 1896. On the facts, the weight of argument was clearly with the advocates of silver.

Four years later, in 1900, the unexpected had occurred. As then resumed, the debate was replete with interest. The lessons of 1892 and 1896 had a direct bearing on the present, and in the light shed by them the outcome could be forecast almost with certainty; but it was a world question. Japan, China, Hindustan, entered into the problem, in which also both Americas were factors. It was a theme to inspire Burke, stretching back, as it did, to the Middle Ages, and involving the whole circling globe. Rarely has any subject called for more intelligent and comprehensive investigation; rarely has one been more confused and befogged by a denser misinformation. The discoverer and scientist, moving hand in hand, had during the remission of the de-

bate, been getting in their work, and under the touch of their silent influence the world's gold production rose by leaps and bounds. Less than 10,000,000 ounces in 1896, in 1899 it had nearly touched 15,000,000; and in money value it alone then exceeded the combined value of the gold and silver production of the period.

So much for the silver question and its possible treatment. In the discussion of 1900 the last word in the debate of 1896 remained to be uttered. A page in history, both memorable and instructive, was to be turned. Next trusts—those vast aggregations of capital in the hands of private combinations, constituting practical monopolies of whole branches of industry, and of commodities necessary to man. Was the world to be subject to taxation at the will of a moneyed syndicate? The debate over this issue, if debate it may be called, is still very recent. In it the lessons of history were effectually ignored; and yet, if applied, they would have been sufficiently suggestive. The historian was as conspicuous for his absence as the demagogue was in evidence.

The curious feature in the present discussion, that which in the mind of the student of things as opposed to words imparts a special interest to it, is that, while the trust of vast aggregation of capital and machinery of production in the hands of individuals intended to control competition is in fact the modern form of monopoly, it is in its methods and results the direct opposite of the old time monopoly; for, whereas, the purpose and practice of that was to extort from all purchasers an artificial price for an inferior article through the suppression of competitors, the first law of its existence for the modern trust is, through economies and magnitude of production, to supply to all buyers a better article at a price so low that other producers are driven from the market. The ground of popular complaint against them is not that they exact an inordinate profit on what they sell, but that they sell so low that the small manufacturer or merchant is deprived of his trade. This distinction with a difference explains at once the wholly futile character of the politician's outcry against trusts. It is easy, for instance, to denounce from the platform the magnates of the sugar trust to a sympathizing audience; and yet not one human being in that audience, his sympathies to the contrary notwithstanding, will the next morning pay a fraction of a cent more per pound for his sugar, that by so doing he may help to keep alive some struggling manufacturer who advertises that his product does not bear the trust stamp.

As to the outcome of conflicts of this character history tells but one story. They can have but one result, a readjustment of

industries. A single familiar illustration will suffice. Any one who chooses to turn back to it can read the story of the long conflict between the loom and the spindle. Formerly, and not so very far back, the distaff and spinning wheel were to be seen in every house; homespun was the common wear. Today the average man or woman has never seen a distaff, or heard the hum of a spinning wheel. Ceasing long since to be a commodity, homespun would be sought for in vain. Yet the struggle between the loom of the manufacturing trust and the old dame's spinning wheel was, literally, for the latter a fight to the death. The operator's time was worth absolutely nothing except at the wheel; she must needs work for any wage; on it depended her bread. A vast domestic, industrial readjustment was involved; one implying untold human suffering. The result was, however, never for an instant in doubt. The trust of that day was left in undisputed control of the field; and it always must, and always will be, just so long as it supplies purchasers with a better article at a lower price than they had to pay before. The process does not vary; the only difference is that each succeeding readjustment is on a larger scale and far more reaching in its effects.

Such, stripped of its verbiage and appeals to sympathy, is the trust proposition. But the popular apprehension always has been, as it now is, that this supply of the better article at a lower price will continue only till the producer, the monopolist, has secured a complete mastery of the situation. Capital, it is argued, is selfish and greedy, corporations are proverbially soulless and insatiable; and, as soon as competition is eliminated, nature will assert itself. Prices will then be raised so as to assure inordinate gains; and when, in consequence of such profits, fresh competitors enter the field, they will either be crushed out of existence by a temporary reduction in price, or absorbed in the trust. All this has a plausible sound; and of it as a theory of practical outcome the politician can be relied on to make the most. But on this head what has the historical investigator to say? His will be the last word in that debate also; his verdict will be final. The lessons bearing on this contention to be drawn from the record cover a wide field of both time and space; they also silence discussion. They tend indisputably to show that the dangers depicted are imaginary. The subject must, of course, be approached in an unprejudiced spirit and studied in a large, comprehensive way. Permanent tendencies are to be dealt with; and exceptional cases must be instanced, classified, and allowed for. Attempts, more or less successful, at extortion in a confidence of mastery, can unquestionably be pointed out; but in the history of economical develop-

ment it is no less unquestionable that, on the large scale and in the long run, every new concentration has been followed by a permanent reduction of price in the commodity affected thereby. The world's needs are continually supplied at a lower cost to the world. Again, the larger the concentration the cheaper the product; till now a new truth of the market place has become established and obtained general acceptance, a truth of the most far-reaching consequence, the truth that the largest returns are found in quick sales at small profits.

Does history furnish any instance of a financial, an industrial, or a commercial enterprise—a bank, a factory, or an importing company—ever having been powerful enough long to regulate the price of any commodity regardless of competition except when acting in harmony with and supported by governmental power? Is not the monopolist practically impotent unless he has the constable at his call? To answer this question absolutely would be to deduce a law of the first importance from the general experience of mankind. So doing would call for a far more careful examination than is now in my power to make, were it even within the scope of my ability; but if my supposition prove correct the corollary to be drawn therefrom is to us as a body politic and at just this juncture one of the first and most far-reaching import. In such case the modern American trust, also, so far as it enjoys any power as a monopoly, or admits of abuse as such, must depend for that power and the opportunity of abuse solely on governmental support and coöperation. Its citadel is then the custom house. The moment the United States revenue officer withdrew his support the American monopolist would cease to monopolize, except in so far as he could defy competition by always supplying a better article at a price lower than any other producer in the whole world.

The Issue of Imperialism.—It remains to pass on to the third and last of the matters in debate during 1900, that known as imperialism. This was the really great issue before the American people then; and it is the really great issue before them now. That issue, moreover, I with confidence submit, can be intelligently considered only from the historical standpoint. Indeed, unless approached through the avenues of human experience, it is not even at once apparent how the question, as it now confronts us, arose and injected itself into our political action; and accordingly, it is in some quarters even currently assumed that it is there only fortuitously, a feature in the great chapter of accidents, a passing incident, which may well disappear as mysteriously and as suddenly as it came. Studied historically, I do not think this view of the situation will bear examination.

On the contrary, I fancy even the most superficial investigator, if actuated in his inquiry by the true historical spirit, would soon reach the conclusion that the issue so recently forced on us had been long in preparation, was logical and inevitable, and for our good or our evil must be decided, rightly or wrongly, on a large view of great and complex conditions.

Leslie Stephen, in one of his essays, truly enough says: "The Catholic and the Protestant, the Conservative and the Radical, the Individualist and the Socialist, have equal facility in proving their own doctrines with arguments which habitually begin, 'All history shows.' Printers should be instructed always to strike out that phrase as an erratum, and to substitute 'I choose to take for granted.'" And elsewhere the same writer lays it down as a general proposition that: "Arguments beginning 'All history shows' are always sophistical." What is by some known as the doctrine of manifest destiny is, I take it, identical with what others, more piously minded, refer to as the will, or call, of God. The Mohammedans say: "God clearly calls us" to this or that work; and with a conscience perfectly clear proceed to rob, slay, and oppress. In like manner the political buccaneer and land pirate proclaims that the possession of his neighbor's territory is rightfully his by manifest destiny. The philosophical politician next drugs the conscience of his fellowmen by declaring solemnly that "all history shows" that might is right; and with time, the court of last appeal, it must be admitted possession is nine points in the law's ten. It cannot be denied, also, that quite as many crimes have been perpetrated in the name of God and of manifest destiny as in that of liberty. That, at least, "all history shows." But, all the same, just as liberty is notwithstanding a good and desirable thing, so God does live and will, and there is something in manifest destiny. As applied to the development of the races inhabiting the earth it is, I take it, merely an unscientific form of speech; the word now in vogue is evolution, the phrase "survival of the fittest." When all is said and done that unreasoning instinct of a people which carries it forward, in spite of and over theories to its manifest destiny, amid the despairing outcries and long-drawn protestations of theorists and ethical philosophers, is a very considerable factor in making history; and consequently one to be reckoned with.

In plain words then, and Mr. Stephen to the contrary notwithstanding, "all history shows" that every great, aggressive, and masterful race tends at times irresistibly toward the practical assertion of its supremacy, usually at the cost of those not so well adapted to existing conditions. In his great work Mommsen formulates the law

with a brutal directness distinctly Germanic: "By virtue of the law that a people which has grown into a State absorbs its neighbors who are in political nonage, and a civilized people absorbs its neighbors who are in intellectual nonage—by virtue of this law, which is as universally valid and as much a law of nature as the law of gravity—the Italian nation (the only one in antiquity which was able to combine a superior political development and a superior civilization, though it presented the latter only in an imperfect and external manner) was entitled to reduce to subjection the Greek States of the East which were ripe for destruction, and to dispossess the peoples of lower grades of culture in the West—Libyans, Iberians, Celts, Germans—by means of its settlers; just as England with equal right has in Asia reduced to subjection a civilization of rival standing, but politically impotent, and in America and Australia has marked and ennobled and still continues to mark and enoble extensive barbarian countries with the impress of its nationality."

The following quotation I must commend to the thoughtful consideration of those classified in the political nomenclature of the day as Anti-Imperialists. A most conscientious and high-minded class, possessed with the full courage of their convictions, the efforts of the Anti-Imperialists will not fail, we and they may rest assured, to make themselves felt. They enter into the grand result. Nevertheless, for them there is food for thought, perhaps for consolation, in this other general law, laid down in 1862 by Richard Cobden:

"From the moment the first shot is fired, or the first blow is struck, in a dispute, then farewell to all reason and argument; you might as well attempt to reason with mad dogs as with men when they have begun to spill each other's blood in mortal combat. I was so convinced of the fact during the Crimean War, which, you know, I opposed, I was so convinced of the utter uselessness of raising one's voice in opposition to war when it was once begun that I made up my mind that as long as I was in political life, should a war again break out between England and a great power, I would never open my mouth on the subject from the time the first gun was fired till the peace was made, because when a war is commenced it will only be by the exhaustion of one party that a termination will be arrived at. If you look back at our history what did eloquence in the persons of Chatham or Burke do to prevent a war with our first American colonies? What did eloquence in the persons of Fox and his friends do to prevent the French Revolution, or bring it to a close? And there was a man who at the commencement of the Crimean War opposed it in terms of eloquence,

in power, and pathos, and argument equal — in terms, I believe, fit to compare with anything that fell from the lips of Chatham and Burke—I mean your distinguished townsman, my friend Mr. Bright—and what was his success? Why, they burnt him in effigy for his pains.”

Turning from the authorities and the lessons by them deduced from the record called history, let us now consider the problem precipitated on the American people by the Spanish war of 1898. The first and most important lesson is one which, in theory at least, is undisputed; though to live up to it practically calls for a courage of conviction not yet in evidence. That a dependency is not merely a possession, but a trust, a trust for the future, for itself, and for humanity, is accepted by us in this debate as a postulate. Accordingly, our dependencies are in no wise to be exploited for the general benefit of the alien owner, or that of individual components of that owner, but they are to be dealt with in a large and altruistic spirit with an unselfish view to their own utmost development, materially, morally, and politically. And, through a process of negatives, “all history shows” that only when this course is hereafter wisely and consecutively pursued, should that blessed consummation ever be attained, will the dominating power itself derive the largest and truest benefit from its possessions. As yet no American of any character, much less of authority, has come forward to controvert this proposition. But, assuming the correctness of the proposition I have just formulated, a corollary follows from it. A formidable proposition, I state it without limitations, meaning to challenge contradiction, I submit that there is not an instance in all recorded history, from the earliest precedent to that now making, where a so-called inferior race or community has been elevated in its character, or made self-sustaining and self-governing, or even put on the way to that result, through a condition of dependency or tutelage. I say “inferior race”; but, I fancy, I might state the proposition even more broadly. I might without much danger assert that the condition of dependency, even for communities of the same race and blood, always exercises an emasculating and deteriorating influence. I would undertake, if called on, to show also that this rule is invariable—that from the inherent and fundamental conditions of human nature it has known and can know no exceptions. This truth, also, I would demonstrate from well-nigh innumerable examples, that of our own colonial period among the number. In our case it required a century to do away in our minds and hearts with our dependential traditions. The Civil War and not what we call the Revolution was our real war of independence. And yet in our time of de-

pendency you will remember we were not emasculated into a resigned and even cheerful self-incapacity as the natural result of a kindly, paternal, and protective policy; but, as Burke with profound insight expressed it, with us the spirit of independence and self-support was fostered “through a wise and salutary neglect.” But, for present purposes, all this is unnecessary, and could lead but to a poor display of commonplace learning. The problem today engaging the attention of the American people is more limited. It relates solely to what are called “inferior races”; those of the same race, or of cognate races, we as yet do not propose to hold in a condition of permanent dependency; those we absorb or assimilate. Only those of “inferior race,” the less developed or decadent, do we propose to hold in subjection, dealing with them, in theory at least, as a guardian deals with a family of wards.

What History Teaches.—My proposition then broadens. If history teaches anything in this regard it is that race elevation, the capacity in a word for political self-support, cannot be imparted through tutelage. Moreover, the milder, the more paternal, kindly, and protective the guardianship, the more emasculating it will prove. A “wise and salutary neglect” is the more beneficent policy; for, with races as with individuals, a state of dependency breeds the spirit of dependency. Take Great Britain, for instance. That people, working at it now consecutively through three whole centuries, after well-nigh innumerable experiences and as many costly blunders, Great Britain has, I say, developed a genius for dealing with dependencies, for the government of “inferior races”; a genius far in advance of anything the world has seen before. Yet my contention is that, today, after three rounded centuries of British rule, the Hindus, the natives of India, in spite of all material, industrial, and educational improvements—roads, schools, justice, and peace—were in 1900 less capable of independent and ordered self-government, than they were in the year 1600, the year when the East India Company was incorporated under a patent of Elizabeth. The native Indian dynasties, those natural to the Hindus, have disappeared; accustomed to foreign rule, the people have no rulers of their own, nor could they rule themselves. The rule of aliens has with Hindustan thus become a domestic necessity. Remove it—and the highest and most recent authorities declare it surely will some day be removed—chaos would inevitably ensue. What is true of India is true of Egypt. Schools, roads, irrigation, law and order, and protection from attack, she has them all—

“But what avail the plough or sail,
Or land or life, if freedom fail?”

The capacity for self-government is not acquired in that school.

But of this England itself furnishes an example in its own history, an example well-nigh forgotten. In fundamentals human nature is much the same now as 20 centuries back. During the first century of the present era the Romans, acting in obedience to the law laid down by Mommsen—the law quoted by me in full, and the law of which Thomas Carlyle is the latest and most eloquent exponent, the law known as the Divine Right of the most Masterful—acting in obedience to that law the Romans in the year of grace 43 crossed the British channel, overthrew the Celts and Gauls gathered in defense of what they mistakenly deemed their own, and, after reducing them to subjection, permanently occupied the land. They remained there four centuries, 100 years longer than the English have been in Calcutta. During that period they introduced civilization, established Christianity, constructed roads, dwellings and fortifications. Materially, the condition of the country vastly improved. The Romans protected the inhabitants against their enemies; also against themselves. During hundreds of years they benevolently assimilated them. Doubtless on the banks of the Tiber the inhabitants of what is now England were deemed incapable of self-government. Probably they were; unquestionably they became so. When the legions were at last withdrawn the results of a kindly paternalism, secure protection, and intelligent tutelage became apparent. The race was wholly emasculate. It cursed its independence; it deplored its lost dependency. As the English historian (Green) now records the result: “They forgot how to fight for their country when they forgot how to govern it.”

Man is always in a hurry; God never! is a familiar saying. Certainly, nature works with a discouraging indifference to generations. Each passing race of reformers and regenerators does indisputably love to witness some results of its efforts; but, in the case of England, in consequence of the emasculation incident to tutelage and dependency on a powerful, a benevolent, and beneficent foreign rule, after that rule ended—as soon or late such rule always must end—throughout the lives of 18 successive generations emasculated England was overrun. At last, with some half dozen intermediate rulers, the Normans succeeded the Romans. They were conquering masters; but they domesticated themselves in the British Islands, and in time assimilated the inhabitants thereof, Saxons, Picts, and Celts, benevolently or otherwise. But, as nearly as the historian can fix it, it required 800 years of direst tribulation to educate the people of England out of that spirit of self-distrust and dependency into

which they had been reduced by four centuries of paternalism, at once Roman and temporarily beneficent. Twelve centuries is certainly a discouraging term to which to look forward. But steam and electricity have since then been developed to a manifest quickening of results. Even the pace of nature was in the 19th century vastly accelerated.

Briefly stated then, the historical deduction would seem to be somewhat as follows: Where a race has in itself, whether implanted there by nature or as the result of education, the elevating instinct and energy, the capacity of mastership, a state of dependency will tend to educate that capacity out of existence; and the more beneficent, paternal, and protecting the guardian power is, the more pernicious its influence becomes. In such cases the course most beneficial in the end to the dependency, now as a century ago, would be that characterized by “a wise and salutary neglect.” Where, however, a race is for any cause not possessed of the innate saving capacity, being stationary or decadent, a state of dependency while it may improve material conditions, tends yet further to deteriorate the spirit and to diminish the capacity of self-government; if severe, it brutalizes; if kindly, it enervates.

Following yet further the teachings of experience, we are thus brought to a parting of the ways, a parting distinct, unmistakable. Heretofore the policy of the United States, as a nationality, has, so far as the so-called inferior races are concerned, been confined in its operation to the North American continent; but, as a whole and in its large aspects, it has been well-defined and consistent. We have proceeded on the theory that all government should in the end rest on the consent of the governed; that any given people is competent to govern itself in some fashion, and that in the long run any fashion of self-imposed government works better results than will probably be worked by a government imposed from without. In other words, the American theory has been that, in the process of nature and looking to ultimate, perhaps remote, conditions, any given people, not admitting of assimilation, will best work out its destiny when left free to work it out in its own way.

Mexico and Haiti afford striking illustrations of a long and rigid adherence to this policy on our part and of the results of that adherence. Conquering and dismembering Mexico in 1847, we, in 1848, left it to its own devices. So completely had the work of subjugation been done that our representatives had actually to call into being a Mexican government with which to arrange terms of peace. With that simulacrum of a national authority we made a solemn treaty; and, after so doing, left

Mexico to work out its destiny, if it could, as it could. In spite of numerous domestic convulsions and much internal anarchy, from that day to this we have neither ourselves intervened in the internal affairs of our Southern continental neighbor, nor long permitted such interference by others. To Mexico we have said: "Walk alone"; to France, "Hands off." The result we all know has gone far to justify our theory of the true path of human advancement.

Haiti presents another case in point with results far more trying to our theory. We have toward Haiti pursued exactly the policy pursued by us with Mexico. Not interfering ourselves in the internal affairs of the island, we have not permitted interference by others. For the condition of affairs prevailing in Haiti, occupied by an inferior race, apparently lapsing steadily toward barbarism, the United States is morally responsible. Acting on the law laid down in the extract we might at any time during the last quarter of a century have intervened in the name of humanity, and to the great temporary advantage of the inhabitants of the one region "where Black rules White." The United States has abstained from so doing in the belief that in the long run and grand results the inhabitants of Haiti will best work out their problem if left to work it out themselves. Yet the case of Haiti is crucial. Persistently to apply our policy there, evinces, it must be admitted, a robust faith in the wisdom of its universal application. The logical inference, so far as the Philippine Islands is concerned, is obvious.

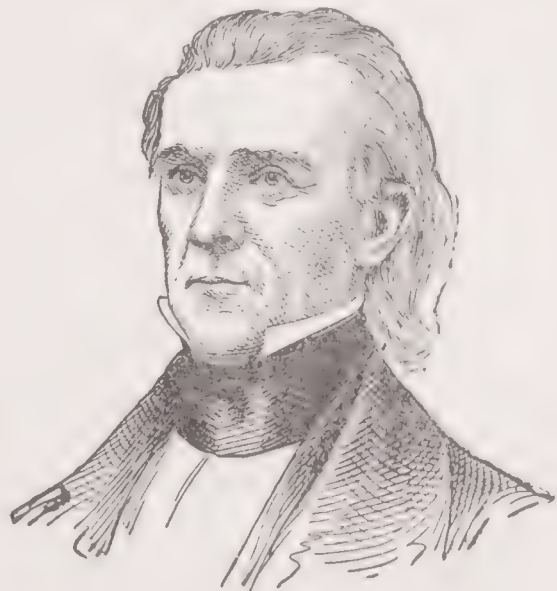
Political Offenses, those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. In modern times the crimes considered political offenses have varied at different periods and in different states. In Great Britain the most serious political offenses are termed treason (see TREASON and TREASON FELONY), and those of a lighter nature, which do not aim at direct and open violence against the laws or the sovereign, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. (See SEDITION). Political offenders of foreign countries are by English law not included in extradition treaties. In the United States also, and in most of the countries of Europe, the extradition treaties do not include the giving up of political offenders.

Political Parties, division of people in a State marked off by the particular views they hold as to the public policy to be pursued in the best interests of the people at large. In the United States the chief political parties are the Democrats and the Re-

publicans, the former favoring a tariff for revenue purposes only; the latter a tariff not only for purposes of revenue, but also for incidental protection to American industries. See FREE TRADE: PROTECTION.

Politics, the science which treats of the distribution of power in a country. Domestic politics investigates the distribution of power among the several classes or individuals belonging to a particular country, the best form of government for the nation, the proper balance of power among the three leading classes of the community—the upper, the middle, and the lower classes—the means of preserving and developing the prosperity of the people, and defending the body politic against foreign aggression or domestic sedition. Foreign politics treats of the politics of foreign nations, particularly as affecting the interests of our own country. Popularly, the political sentiments of an individual, his procedure in promoting the interests of his party, or his own.

Polk, James Knox, an American statesman, 11th President of the United States; born in Mecklenburg co., N. C., Nov. 2,



JAMES K. POLK.

1795. His ancestors, who bore the name Pollock, emigrated from the W. of Ireland early in the 18th century. He was educated at the University of Nashville, Tenn., to which State his father had removed in 1806, and was admitted to the bar in 1820. In 1823 he was sent to the Tennessee Legislature, and in 1824 to Congress, to which body he was reelected for seven successive terms, serving till 1839. He was made chairman of the Committee of Ways and Means in 1833, and twice elected Speaker of the House—1835–1837. In Congress he was consistently a Democrat, supporting unwaveringly the administrations of Jackson and Van Buren, and opposing that of Adams. In 1839 he was elected governor of Tennessee, and in 1844 unexpectedly nominated as a compromise candidate of the

National Democratic Convention for the presidency, and elected over Henry Clay, the Whig candidate. His administration was eventful, and in some respects brilliant. Texas was annexed, and the Mexican War fought, which, with territorial purchases, added the great territory now comprising Texas, California, New Mexico, Utah, Nevada, and the W. part of Colorado to the domain of the United States. The Oregon boundary forming one of the issues on which he was elected, was settled by a compromise offered by England. He was a man of eminent administrative abilities, of consistent principles, and pure and upright private character. At the close of his single term Polk declined to stand for re-election, and retired to private life in Nashville, Tenn., where he died June 15, 1849.

Polk, Leonidas, an American military officer; born in Raleigh, N. C., April 10, 1806; was a cousin of President Polk, and grandson of Col. Thomas Polk, an officer of the Revolution. Graduating at the United States Military Academy in 1827, he received a commission in the artillery, but was induced to study for the ministry, and in 1830 received deacon's, and in 1831 priest's orders in the Episcopal Church. In 1838 he was consecrated Bishop of Arkansas and Indian Territory, with charge of the dioceses of Alabama, Mississippi, and Louisiana; in 1841 he resigned all these except the bishopric of Louisiana, which he retained—even when at the head of an army corps—till his death. Soon after the outbreak of the Civil War he was offered a major-generalship by Jefferson Davis, and, accepting it, proceeded to strongly fortify strategical points on the Mississippi. At Belmont, in November, 1861, he was driven from his camp by Grant, but returned and eventually compelled him to retire. At Shiloh and at Corinth he commanded the 1st corps; in October, 1862, he was promoted to Lieutenant-General, and in November he conducted the retreat from Kentucky. After Chickamauga, where he commanded the right wing, he was relieved of his command; but in December, 1863, he was appointed to the Department of Alabama, Mississippi, and Eastern Louisiana, and he afterward joined Johnston in opposing Sherman's march to Atlanta. He was killed while reconnoitering on Pine Mountain, June 14, 1864, by a cannon shot fired by some Northern officers who wished to give the bishop's party a fright.

Polka, a well known dance, the music to which is in $\frac{2}{4}$ time, with the third quaver accented. There are three steps in each bar, the fourth beat is always a rest, the three steps are performed on the three first beats of every bar.

Polko, Elise, a German story-writer; born in Leipsic, Germany, Jan. 31, 1822. She wrote an interesting series of "Musical Tales" (first installment 1852); also "A Woman's Life" (1854); "In the Artist World"; "Reminiscences of Felix Mendelssohn Bartholdy" (1868); "Conversations" (1872); "From the Year 1870"; "New Story-Book" (1884). She died May 15, 1899.

Pollack, *Gadus pollachius*, a common fish on British coasts, belonging to the cod, haddock, and whiting genus. It is about the size of the coal-fish, is active in habit, and is frequently caught. The lower jaw projects beyond the upper, and there is no barbel. In Scotland and in some parts of Ireland it is called lythe.

Pollaiuolo, Antonio, an Italian goldsmith, medallist, metal-caster, and painter; born in Florence in 1429. He cast a sepulchral monument for Pope Sixtus IV., and a similar one for Pope Innocent VIII. (died 1492), both in St. Peter's, and both works of great merit. Antonio's pictures—the best being "Hercules slaying the Hydra," "Hercules destroying Antæus," and "St. Sebastian"—are distinguished for the life and vigor of their drawing. He died in Rome in 1498. His brother PIETRO; born in Florence in 1443; was generally associated with him in his work, though he devoted most attention to painting. To him are attributed an altarpiece introducing SS. James, Vincent, and Eustace (if indeed it is not mainly by the other brother), an "Annunciation," a "Coronation of the Virgin," and the "Five Virtues." He died in Rome in 1496.

Pollan, or **Powan**, *Coregonus pollan*, from the Irish Lakes, somewhat resembling a herring (*Clupea harengus*), but with a remarkably short head and deep body.

Pollanarrua, a ruined city of Ceylon, 60 miles E. N. E. of Kandy, with a massive dagoba, and a wide area of ruined buildings that attest the size and importance of the city, which became the capital of the kingdom about 770, after the Malabar invasion ruined Anuradhapura, the former capital. The city stood on the site of an immense tank, still called Topaweva or Topare. The place was first made known to Europeans in 1820.

Pollard, the name given to a tree the head of which has been lopped off about 8 or 10 feet from the ground, in order to induce it to send out bushy shoots, which are cut periodically for basket making, fuel, fencing, or other purposes.

Pollard, Edward Albert, an American journalist and author; born in Virginia, Feb. 27, 1828. As editor of the Richmond "Examiner" during the Civil War, he was an earnest advocate of the Confederate

Pollard

cause, but an active opponent of Jefferson Davis. Among his numerous works are: "Black Diamonds" (1859); "Southern History of the War" (1862); "The Lost Cause" (1866); "The Life of Jefferson Davis" (1869). He died in Lynchburg, Va., Dec. 12, 1872.

Pollard, Josephine, an American writer of juvenile literature; born in New York city in 1843. Her works include: "The Gypsy Books" (1873-1874); "Elfin Land" (1882), poems; "Gellivor, a Christmas Legend" (1882); "The Boston Tea Party" (1882). She died in New York Aug. 15, 1892.

Pollen, in botany, the pulverulent or other substance which fills the cells of the ANTHHER (*q. v.*). It consists of minute granules varying in size and inclosing a fluid containing molecular matter. The granules are usually produced in fours, and may be spherical or slightly oblong, cylindrical, etc. The color is generally yellow, but in *Epilobium augustifolium*, and many Polemoniaceæ, it is blue; in *Verbascum* it is red; in no case is it green. When the anther dehiscens, the pollen is emitted. It is the male element in a plant, corresponding to the seminal fluid in animals, and is designed to fertilize the seed. In entomology, pollen collected from plants and carried on the outer surface of the tibiæ of bees. Mixed with honey, it becomes the food of the larvæ.

Pollio, Caius Asinius, a Roman soldier; born in Rome, 76 B. C. He sided with Cæsar in the civil war fought at Pharsalia, and commanded in Spain against Sextus Pompeius, but was defeated. He sided with the triumvirs against the oligarchic senate, and was appointed by Antony to settle the veterans on the lands assigned them in Transpadane Gaul. It was now that he saved the property of the poet Vergil at Mantua from confiscation. After Antony and Octavian had quarreled, it was Pollio who effected their temporary reconciliation at Brundisium (40). This year he was consul, when Vergil's fourth eclogue was addressed to him. The year after he went to Greece as legate of Antony, and defeated the Parthini, a people of Illyria. This was the period of Vergil's eighth eclogue, also addressed to Pollio. Thereafter he withdrew altogether from political life, and survived till A. D. 4. Pollio was the first to establish a public library at Rome, and was the patron of Vergil, Horace, and other poets. His own orations and tragedies and history have perished, and it is most probably no great loss. The severest critics are seldom themselves even decent writers, and he, we are told, censured Cicero, Sallust, and Cæsar.

Pollock, an illustrious family descended from David Pollock, saddler to George III.

Pollock

in the later part of the 18th century, who kept a shop near Charing Cross. Three of his sons rose to eminence — SIR DAVID POLLOCK, chief justice of Bombay (died 1847); SIR FREDERICK POLLOCK; and field-marshal SIR GEORGE POLLOCK. The second, FREDERICK, was born Sept. 23, 1783, and in 1802 passed from St. Paul's School to Trinity College, Cambridge, where in 1806 he graduated B. A. as senior wrangler and first Smith's prizeman. Next year he was elected a fellow of his college, and called to the bar at the Middle Temple. He traveled the N. circuit; in 1827 became a K. C.; in 1831 was returned as a Tory for Huntingdon; was attorney-general in 1834-1835 and 1841-1844; and in the last year succeeded Lord Abinger as Chief Baron of the Exchequer. He had been knighted in 1834, and on his retirement in 1866 he received a baronetcy. He died Aug. 23, 1870. His eldest son, SIR FREDERICK POLLOCK; born April 3, 1815, was educated at Trinity College, Cambridge (1832-1836), and in 1838 was called to the bar at the Inner Temple. He was appointed a master of the Court of Exchequer (1846), and Queen's Remembrancer (1874); in 1876 became senior master of the Supreme Court of Judicature; in 1886 resigned his offices. Besides a good many quarterly and magazine articles, he published a blank verse translation of Dante (1854), and two pleasant volumes of "Personal Remembrances" (1887). He died Dec. 24, 1888. His eldest son, also SIR FREDERICK POLLOCK, third baronet; born Dec. 10, 1845, and from Eton passed to Trinity, where in 1868 he obtained a fellowship. He was called to the bar at Lincoln's Inn in 1871, and became Professor of Jurisprudence at University College, London (1882), Corpus Professor of Jurisprudence at Oxford (1883), and Professor of Common Law (1884). Besides "Spinoza: his Life and Philosophy" (1880), he published, among other valuable legal works: "Principles of Contract" (1875); "Digest of the Law of Partnership" (1877); "Law of Ports" (1887); and "Oxford Lectures" (1891). His younger brother, WALTER HERRIES POLLOCK, born Feb. 21, 1850, and likewise educated at Eton and Trinity, was called to the bar at the Inner Temple in 1874, and 10 years later became editor of the "Saturday Review." He is author of "Lectures on French Poets," "The Picture's Secret," "Verses of Two Tongues," "A Nine Men's Morrice," "Old and New," etc. GEORGE FREDERICK POLLOCK, born in 1821, third son of the first baronet, became a master of the Supreme Court of Judicature; and the fourth son, SIR CHARLES EDWARD, born in 1823, became a baron of Exchequer and judge of the High Court.

SIR GEORGE POLLOCK, field-marshal; born in Westminster June 4, 1786, and entered

the army of the East India Company as lieutenant of artillery in 1803. Almost immediately after his arrival in India he was engaged in active warfare, in the battle and siege of Deig in Bhartpur (1804), at the siege of Bhartpur (1805), and in other operations in the war against Holkar. Nine years later he saw some service in the Nepal (Goorkha) campaigns of 1814-1816, and in the first Burmese war (1824-1826) he took an active share, winning his colonelcy. In 1838 he reached the rank of major-general. After the massacre of General Elphinstone and his forces in the passes of Afghanistan the Indian government decided to send a force to the relief of Sir Robert Sale, who was shut up in Jelalabad. The command of the relieving force was given to General Pollock. In April, 1842 (5th to 16th), he forced the formidable Khyber Pass, and reached Sir Robert Sale; then, after a few months' delay, he pushed on to Kabul, his object being to restore the prestige of the British arms and to rescue the British prisoners in the hands of Akbar Khan. Both purposes were crowned with success; he defeated the Afghan chief at Tezeen, and destroyed the bazaar in Kabul, and he recovered 135 British prisoners. Then, after being joined by the forces of General Nott, who had marched from Kandahar, he successfully conducted the united armies back to India. He was rewarded with a G. C. B. and a political appointment at Lucknow. He returned to England in 1846, was director of the East India Company for a couple of years (1854-1856), and was created a field-marshal in 1870, and a baronet in 1872; in 1871 he was appointed to the honorable office of constable of the Tower. He died Oct. 6, 1872, and was buried in Westminster Abbey.

Pollok, Robert, a Scotch poet; born in Muirhouse, in the parish of Eaglesham, Renfrewshire, in 1799; was educated at Glasgow University, studied divinity, and was licensed as a preacher by the Associate Presbytery of Edinburgh in the spring of 1827. He is the author of a series of "Tales of the Covenanters," and a blank verse poem, "The Course of Time," which in spite of many faults enjoyed a wonderful popularity both in Great Britain and the United States. He died soon after the publication of his poem, in Southampton, England, in 1827.

Poll Tax, a tax levied per head in proportion to the rank or fortune of the individual; a capitation tax. This tax was first levied in England in 1377 and 1380, to defray the expenses of the French war; its collection in 1381 led to the insurrection of Wat Tyler. In the United States a poll tax (varying from 25 cents to \$3 annually) is levied in most of the States, in addition to the taxes on property. In some States

its payment is a necessary prerequisite for voting.

Pollux, a celebrated hero of the Grecian mythology, and twin brother of Castor, after whose death he implored Jupiter to render him immortal. His prayer could not be entirely granted, but Jupiter divided immortality between the brothers, each living and dying alternately. In astronomy, one of the twins forming the constellation Gemini. Also the name of a star of the second magnitude in the same constellation. In mineralogy, a hydrated silicate of alumina, potash, and soda, remarkable for containing 34 per cent. of cæsium. It is a rare mineral.

Pollux, Julius, a Greek sophist and grammarian; born in Naucratis, Egypt, about the year A. D. 135. He went to Rome during the reign of Marcus Aurelius, who appointed him one of the preceptors of his son Commodus. He wrote several works, all of which have perished except his "Onomasticon," dedicated to Commodus, and therefore published before 177. This work is of great value in the study of Greek antiquity.

Polo, an equestrian game, which may be shortly described as hockey on horseback. It is of Oriental origin and of high antiquity; indeed, it has been claimed that it can be traced back to 600 B. C. Polo was first played by Europeans in 1863 in Calcutta, whither it had been brought by officers who had been stationed in Cachar in Assom, where polo has been played since time immemorial by the hill tribe of Manipuris. Almost the same game exists in Tibet; while native equestrian games more or less closely resembling polo are played in Japan and other parts of the East. Since 1871 many polo clubs have been started in Great Britain and, since 1876, in the United States, as well as wherever Britons are found in the East. The principal British club, which makes the rules of the game, is at Hurlingham, near London. The following is a short description of polo: An oblong space of turf is marked out, of which the proper size is 300 yards by 200 yards; at each end in the center of the line two poles are fixed 22 feet apart, forming the goals through which it is the object of the opposing sides to strike the ball. The players are mounted on ponies, the size of which, according to rule, should not exceed 14 hands; and each player is armed with a polo stick, consisting of a strong cane about 4 feet long with a cross head about 8 inches long, with which to strike the ball of light wood. The proper number of players is four a side, each of whom has a definite place (numbered one, two, three, and back) in relation to friends and opponents; and in polo, as in most games, combination is perhaps the first condition of success. The

Polo

ponies have to be carefully trained, and some acquire wonderful cleverness in understanding what is required of them. It is part of the game so to ride alongside an opponent as to prevent him from hitting the ball, but it is not allowed to ride across in front of an opponent. To become a good player requires strength, good horsemanship, a quick eye, and much practice.

Polo, Marco, a Venetian traveler of the 13th century, the son of a merchant, who, with his brother, had penetrated to the court of Kublai, the great khan of the Tartars. This prince, being highly entertained with their account of Europe, made them his ambassadors to the Pope; on which they traveled back to Rome, and, with two missionaries, once more visited Tartary, accompanied by the young Marco, who became a great favorite with the khan. Having acquired the different dialects of Tartary, he was employed on various embassies; and after a residence of 17 years, all the three Venetians returned to their own country in 1295, with immense wealth. Marco afterward served his country at sea against the Genoese, and, being taken prisoner, remained many years in confinement, the tedium of which he beguiled by composing the history of his "Travels." Marco Polo relates many things which appear incredible, but the general truthfulness of his narrative has been established by succeeding travelers. An English translation of the "Travels of Marco Polo" was published by William Marsden, the Orientalist, in 1817.

Polonaise, a Polish national dance, which has been imitated, but with much variation, by other nations. The polonaise, in music, is a movement of three crotchets in a bar, characterized by a seeming irregularity of rhythm, produced by the syncopation of the last note in a bar with the first note of the bar following, in the upper part or melody, while the normal time is preserved in the base. Movements of this sort were once universally popular.

Polonium, a radio-active metallic element, resembling nickel in color, and present in certain uranium minerals, particularly pitchblende and chalcocite. It was discovered, and named in honor of her native Poland, by Madame Curie (*q. v.*) in 1898. Polonium is found in the company of bismuth, which it closely resembles in chemical properties. Many eminent physicists deny the existence of polonium, claiming that it is only a radio-active form of bismuth, having attained radiation by its association with radium (*q. v.*) in the pitchblende. The difference between radium and polonium is that while the former gives off three kinds of rays or radiations, the latter appears to give off but one variety, and its activity is transient. Akin in its manifestations to the Roentgen rays (*q. v.*), polonium is

Polybius

nevertheless not nearly so penetrating as is the ordinary primary radiation of these rays.

Poltava, or **Pultawa**, a province of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson, and Kiev; area 19,265 square miles; pop. (1908) 3,472,100. It consists of an extensive and somewhat monotonous flat, watered by several tributaries of the Dnieper. It is one of the most fertile and best cultivated portions of the Russian empire, and grows large quantities of grain. Live stock and bee rearing are important branches of the rural economy. Both manufactures and trade are of very limited extent. Education is much neglected. Poltava, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, important educational institutions, etc. As a place of trade Poltava derives importance from the great fair held on July 20 each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII. in 1709. Pop. (1908) 53,703.

Polyænus, a Greek writer of the 2d century, native of Macedonia. He wrote a historical collection of instances of military ruses employed by Greeks, Romans, and barbarians. It was entitled "Strategies," or "Stratagems," and was inscribed to the emperors Marcus Aurelius and Lucius Verus. The work is extant. It was first printed in 1549, and again in 1887.

Polyandry, the possession of more than one husband at the same time. Spencer traces several social forms of it, each form an advance on its predecessor: (1) One wife has several unrelated husbands, and each of the husbands has other unrelated wives; (2) the unrelated husbands have but one wife; (3) the husbands are related; (4) the husbands are brothers. The custom is still widely spread in the East.

Polyanthus, a beautiful and favorite variety of the common primrose (*Primula vulgaris*), a native of most parts of Europe, growing in woods and copses in a moist clayey soil. The leaves are obovate, oblong, toothed, rugose, and villous beneath. The flowers are in umbels on a scape or flower-stalk three to six inches or more in length. In addition to propagating from seeds polyanthus may also be readily increased by division. The seeds should be sown in June.

Polybius, a Greek historian; born in Megalopolis, Greece, probably about 204 B. C. He was the son of Lycortas, who succeeded Philopœmen as general of the Achæan League, and he profited both by the example and instructions of Philopœmen. In the funeral procession of the latter from Mesene to Megalopolis, Polybius bore the urn

containing the ashes of his friend. He was one of the 1,000 Achæans carried to Italy in 168, on the charge of not having assisted the Romans against Perseus. He lived in the house of Æmilius Paulus, and became the intimate friend of his son Scipio; returned with his fellow exiles to Greece, in 151; accompanied Scipio to the siege of Carthage, whence he hastened back to Greece, and rendered such services as he could to his country, then conquered by the Romans. His great work is a general history of the affairs of Greece and Rome from 220 B. C. to 146 B. C., the epoch of the fall of Corinth, prefaced by a summary view of early Roman history. Five only of its 40 books are now extant, with some fragments of the rest, but these are among the most important literary remains of antiquity; for Polybius spared no pains to ascertain facts, studied and traveled extensively, had practical acquaintance, both with politics and war, and insight into the relations of things. His aim was didactic, and a large part of his history consists of disquisitions. He wrote several other works, but they have perished. He died at the age of 82.

Polycarp, St., one of the apostolical fathers of the Church, and a Christian martyr, who, according to tradition, was a disciple of the Apostle John, and by him appointed Bishop of Smyrna. He made many converts, enjoyed the friendship of Ignatius, and opposed the heresies of Marcion and Valentinus; but during the persecution of the Christians under Marcus Aurelius, he suffered martyrdom with the most heroic fortitude, A. D. 166. His short "Epistle to the Philippians" is the only one of his writings that has been preserved.

Polychætæ, an order of annelids, class Chætopoda. The head is distinct; internal organs are according to general plan of the annelids. Reproduction usually by eggs, but some species propagate by dividing into two individuals. With the exception of the *Manyunkia* from the Schuylkill river, all are marine. Many are beautiful in form and color.

Polychromy, the art of coloring statuary to imitate nature, or particular buildings in harmonious, prismatic, or compound tints. Both arts were practised by the nations of antiquity to a considerable extent, and from a very early period. The earliest Greek statues show traces of color, and their public buildings and temples were richly decorated with color. The object of polychromy is to heighten the effect of architectural decoration.

Polycletus of Sicyon, a Greek sculptor and architect, who flourished about 452-412 B. C. His most celebrated statues were the *Doryphorus* (spear-bearer), to which the

name of "canon" or model was given; and his statue of Hera (Juno) in the temple between Argos and Mycenæ. As an architect he also distinguished himself.

Polycotyledonous Plants, those plants of which the embryos have more than two cotyledons or seed lobes. Instances occur in plants of the cruciferous order, and in coniferous plants.

Polycrates, a ruler of the island of Samos from about 536 to 522 B. C. He conquered several islands on the Asiatic mainland, waged war successfully against the inhabitants of Miletus, and defeated their allies, the Lesbians, in a great sea fight. His intimate alliance with Amasis, King of Egypt, proves the importance in which this daring island-prince was held even by great monarchs. According to Herodotus, Amasis dreaded the misfortunes that the envious gods must be preparing for so lucky a mortal, and wrote a letter to Polycrates, earnestly advising him to throw away the possession that he deemed most valuable, and thereby avert the stroke of the spleenful gods. Polycrates, in compliance with this friendly advice, cast a signet-ring of marvelously beautiful workmanship into the sea, but next day a fisherman presented the tyrant with an unusually big fish that he had caught, and in its belly was found the identical ring. It was quite clear to Amasis now that Polycrates was a doomed man, and he immediately broke off the alliance. When Cambyses invaded Egypt (525) Polycrates sent him a contingent of 40 ships, in which he placed all the Samians disaffected toward his tyranny, hoping they might never come back; but mutinying they returned to Samos, and made war against the tyrant, but without success. Hereupon they went to Sparta, and succeeded in securing the help of both Spartans and Corinthians. A triple force of Samians, Spartans, and Corinthians embarked for Samos, and besieged Samos in vain, and Polycrates became more powerful than ever; but fate overtook him after all. Orætes, the Persian satrap of Sardis, had conceived a deadly hatred against Polycrates, and, having enticed the latter to visit him at Magnesia by appealing to his cupidity, he seized and crucified him.

Polycystina, or **Polycistina**, in zoölogy, a sub-order of Radiolaria, placed by Wallich in his *Herpneumata*. They are low in the scale of Radiolaria. They have a siliceous skeleton, generally globular, variously trellised, and composed of two or three basket balls, supported or separated by few or many radiating spicules commencing from a central base or omphalostyle. In life the skeleton is enveloped in a delicate filmy investment of sarcode, with abundant sarcoblasts or ovules. The Polycystina are microscopic, and marine.

Polydamas

Polydamas, (1) a Grecian athlete of immense size and strength. (2) A Trojan hero, friend of Hector.

Polydeuces, or **Pollux**, one of the Dioscuri (*q.v.*). See also CASTOR AND POLLUX.

Polyembryony, the development within the testa of the seed of more than one embryo. It occurs not infrequently in the orange and the hazelnut.

Polygala, milkwort, the typical genus of *Polygalaceæ*. Flowers irregular. Two inner sepals, wing shaped and petaloid; stamens combined by their claws with the filaments, the lower one keeled. Ovary two-celled, two-seeded, seeds downy, crested at the hilum. Known species 200, from temperate and tropical countries. Three are British: *P. vulgaris*, the common, *P. uliginosa* or *austriaca*, the Austrian milkwort, with *P. calcarea* or *amara*, perhaps only a sub-species of the first. *P. vulgaris* has short branches, crowded with ovate or oblong obtuse leaves; the corolla beautifully crested, blue, purple, pink, or white. It is common on dry hilly pastures. *P. vulgaris* and *P. major* are less energetic. An infusion of *P. rubella*, a native of North America, also very bitter, is used in small doses as a tonic and stimulant, and in larger ones as a diaphoretic. The American *P. senega* is snake root. *P. chamæbuxus* from Europe, *P. sanguinea* and *P. purpurea* from North America, *P. paniculata* from the West Indies, *P. serpentaria* from the Cape, and *P. crotalarioides* from the Himalayas, are emetic, purgative, and diuretic. *P. poaya* from Brazil, *P. glandulosa*, and *P. scopario* from Mexico, are emetic. *P. thesioides*, from Chile, is diuretic. *P. tinctoria*, from Arabia, is there used in dyeing, and the Javanese *P. venenosa* is poisonous.

Polygalaceæ, milkworts; an order of hypogynous exogens, alliance Sapindales. Shrubs or herbs, sometimes twining. Leaves simple, exstipulate. Flowers generally racemose, pedicels with three bracts; sepals five, very irregular, three exterior and two (the wings) interior, the latter usually petaloid. Petals three or five, one, the keel, larger; stamens eight or four, usually combined in a tube, split on one side. Ovary superior, compressed, two- or three-celled, with one, rarely two ovules in each. Style one, stigma simple. Fruit fleshy, coriaceous or drupaceous, winged or apterous, with pendulous seeds. Distribution world-wide; known genera 19, species 495 (Lindley); genera 15, species 400 (Sir Joseph Hooker).

Polygamy, the practice or condition of having a plurality of wives or husbands at the same time. It is commonly applied to polygyny, but, strictly speaking, it should include polyandry as well. It is forbidden by law in all Christian countries, but existed among the Mormons, who revived the

Polygon of Forces

polygyny of patriarchal times. See MORMONS.

Polyglot, a collection of versions in different languages of the same work, but is almost exclusively applied to manifold versions of the Bible. The Hexapla of Origen contained, besides the Hebrew text, several other Greek versions, but is not commonly reckoned among the polyglots. The most famous polyglots are (1) the Complutensian, published under the auspices of Cardinal Ximenes at Alcala in six volumes folio, 1502-1517, with Hebrew, Greek, Chaldee (each with Latin versions), and the Vulgate Latin; (2) the Antwerp Polyglot, printed at the Platin press, at the cost of Philip II. of Spain, in 1569-1572, edited by Arias Montanus; (3) the Paris Polyglot, edited by Le Jay in 1645, in six splendid volumes; and (4) the London Polyglot, edited by Brian Walton, in six volumes folio, 1654-1657, and containing the Bible, or parts of it, in nine languages. Of modern works of this kind the most convenient is Bagster's Polyglot, first published by Bagster at London in 1831, which gives the Old Testament in eight languages (Hebrew, Greek, Latin, English, German, Italian, French, and Spanish), and the New Testament in nine (the Syriac version being added).

Polygnotus, a Greek painter, flourished from 450 to 410 B. C. He was a native of the Island of Thasos, and was instructed in his art by his father Aglaophon. Cimon, the rival of Pericles, brought him to Athens and employed him to decorate the Stoa Pæcile, or painted portico at Athens. His works were probably on wood. Polygnotus is represented as being the first who made painting independent of sculpture.

Polygon, in geometry, a portion of a plane bounded on all sides by more than four limited straight lines. These lines are called sides of the polygon, and the points in which they meet are called vertices of the polygon. Polygons are classified according to the number of their sides or angles. Polygons having all their sides equal are called equilateral; those having all their angles equal are called equiangular. Polygons which are both equilateral and equiangular are called regular polygons. Similar polygons are to one another as the squares of their homologous sides. In fortification, the exterior polygon is the figure formed by lines connecting the angles of the bastion round the work. The interior polygon is the figure formed by lines connecting the centers of the bastions all round.

Polygon of Forces, a theorem stated as follows: "If any number of forces acting upon a point be represented in magnitude and direction by the sides of a polygon taken in order, they will be in equilibrium," or "any side of a polygon, taken in reverse order, will represent the magnitude and di-

rection of the resultant of any number of forces acting upon a point, when these forces are represented in magnitude and direction by the remaining sides of the polygon taken in direct order."

Polygonaceæ, buckwheats; an order of hypogynous exogens, alliance Silenales. Herbs, rarely shrubs. Leaves alternate, with stipules cohering round the stem. Flowers often in racemes. Calyx often colored. Ovary generally formed by the adhesion of three carpels, one-celled; ovule one, erect. Styles or stigmas as many as the carpels. Not usually triangular; embryo inverted. Tribes: Eriogoneæ, Polygonæ, Triplareæ, and Brunnicheæ. Distribution, world wide. Known genera 29, species 490. (Lindley.)

Polygonum, in botany, the typical genus of *Polygonaceæ*. Sepals five, sub-equal; styles two or three; fruit wingless, compressed, or triquetrous. Known species 150; distribution, world wide.

Polygynia, an order in Linnæus' artificial classification, containing plants with many pistils.

Polygyny, the marriage by one man of several wives at the same time. Spencer considers that while polygyny has a wide range in time and space, reports of polygynous societies should be received with caution, since wherever polygyny exists monogamy coexists usually to a greater, and always to a great, extent.

Polyhymnia, one of the Muses, daughter of Jupiter and Mnemosyne, who presided over singing and rhetoric, and was deemed the inventress of harmony. She was variously represented; sometimes veiled in white, holding a scepter in her left hand, and with her right hand raised up, as if ready to harangue.



POLYHYMNIA.

Polyides, a Greek poet and musician of the 4th century B. C.; famous for his dithyrambs. To him is credited by Welcker the tragedy of "Iphigenia," some passages from which are quoted by Aristotle in his "Poetics."

Polymerism, in chemistry, the state or character of having the same percentage composition, but differing in molecular

weight. The methene series of hydrocarbons is a good example of polymerism, all the members of it being the multiple of the lowest, CH_2 , methene.

Polymorphism, the property possessed by certain bodies of crystallizing in two or more forms not derivable one from the other. Thus mercuric iodide separates from a solution in tables belonging to the dimetric system; if these crystals are heated they sublime and condense in forms belonging to the monoclinic system; carbonate of calcium exists as calc spar, which crystallizes in rhombohedral forms, and as aragonite, which crystallizes in trimetric forms.

***Polynesia**, a general name for a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, extending from about lat. 35° N. to 35° S., and from lon. 135° E. to 100° W., the Philippines, New Guinea, Australia, and New Zealand being excluded. The islands are distributed into numerous groups, having a general direction from N. W. to S. E. The groups of the equator are the Pelew, Ladrone or Marianne, Caroline, Marshall, Gilbert or Kingsmill, Fanning, and Hawaii or the Sandwich Islands. S. of the equator are New Ireland, New Britain, Solomon Islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey, and the Society Islands, the Low Archipelago, the Marquesas Islands, and the isolated Easter Island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon Islands, New Britain, New Ireland (Bismarck Archipelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrone, Marshall Islands, etc., form Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Some of the former rise to a great height, the highest peak in the Pacific, Mauna Loa, in Hawaii, reaching 13,600 feet. The principal groups of these are the Friendly, the Sandwich, the Marquesas, and the Navigator Islands. The coral islands comprise the Carolines, Gilbert, and Marshall Islands on the N. W., and the Society Islands and Low Archipelago in the S. E., in both of which groups the "atoll" formation is very common, besides numerous other groups where coral reefs occur. The elevations of these groups do not exceed 500 feet.

Polynesia has a comparatively moderate temperature, and the climate is delightful and salubrious. The predominating race, occupying the central and E. portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. The hair and complexion vary greatly, but the latter is often a light brown. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin,

* For Map, see AUSTRALASIA.

Polynices

with negro-like features and crisp mop-like hair. They are confined to Western Polynesia, and speak a different language, with numerous distinct dialects. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers. Many atrocities have been practised on the natives in recent times in connection with luring or kidnapping of them to work in the European settlements. The commercial products consist chiefly of cocoanuts, cotton, coffee, sugar, fruits, pearls, and trepang. The Ladrões were discovered by Magellan in 1521, the Marquesas by Mandaña in 1595, but it was not till 1767 that Wallis, and subsequently Cook, explored and described the chief islands. Since the natives came in contact with the whites their numbers have greatly decreased.

Polynices, brother of ETEOCLES (*q. v.*).

Polyodon. See SPATULARIA.

Polyp, a name usually applied to an animal like the fresh-water hydra or like the sea anemone, having a tubular body and a wreath of many tentacles around the mouth. The name is equally applicable to an isolated individual or to a member (zooid or "person") of a colony. Thus, the individuals which make up a zoophyte or a coral colony are called polyps, and the term is seldom used except in reference to cœlenterate animals. But the history of the word has been strange. In Greek and Latin works on natural history the term *polypous* or *polypus* is usually applied to the octopus (*poulpe*), or some other cuttle fish, though sometimes to the many footed wood louse, oniscus. Réaumur and Jussieu were the first to apply the word to zoöphytes and the like; Lamarck used it more loosely, but gradually it has been narrowed to the signification above noted.

Polyphemus, in mythology, the king of all the Cyclops in Sicily, and son of Neptune and Thoosa. He is represented as a monster of immense strength, and with one eye in the middle of the forehead. He fed on human flesh, and kept his flocks on the coasts of Sicily, when Ulysses, at his return from the Trojan war, was driven there. The Grecian prince and 12 of his companions visited the coast, and were seized by the Cyclops, who daily devoured two of them in his cave, in which they were confined. Ulysses would have shared the same fate, had he not intoxicated the Cyclops, and put out his eye with a firebrand while asleep. Polyphemus, awaked by the sudden pain, stopped the entrance of his cave; but Ulysses made his escape by creeping between the legs of the rams of the Cyclops, which had been put up in the cave. Poly-

Polypterus

phemus became enamored of Galatæa, but his addresses were disregarded, and the nymph shunned his presence. The Cyclops then crushed the head of Acis, his rival, with a piece of broken rock.

Polyphone, a musical instrument of the music-box type, used principally in connection with the graphophone. Also a character or vocal sign which represents more than one sound.

Polyphonic, having, or consisting of, many sounds or voices. In music, consisting of several tone series or parts, progressing simultaneously according to the rules of counterpoint; contrapuntal.

Polyplectron, or **Polyplectrum**, in music, a musical instrument in which the tones were produced by the friction of numerous slips of leather acting on strings, and moved by pressing or striking keys, as in the pianoforte.

In ornithology, a genus of *Phasianinæ*, from the Oriental region. Bill rather slender, sides compressed, tip curved, nostrils lateral; longitudinal opening partly hidden by a membrane. Wings rounded, tail long, rounded. Tarsi long, those of the male with two or more spurs. Toes long and slender. There are five species: *P. thibetanus*, *P. bicalcarantum*, *P. germaini*, *P. emphanum*, and *P. calcurum*, known respectively as the common, the iris, Germain's, Napoleon, and the Sumatran polyplectron.

Polypodiaceæ, in botany, ferns proper; an order of acrogens, alliance Filicales. Leaves, generally called fronds, with the spore cases on the back or edge. Spore cases ringed, distinct, and splitting irregularly. Tribes: Polypodeæ, Cyatheæ, Parkeræ, Hymenophylleæ, Gleichenæ, and Osmundæ. Known genera 183, species 2,000. (Lindley.)

Polypodium, in botany, polypody; the typical genus of *Polypodiaceæ*. Frond simple, lobed, often pinnatifid; sori dorsal, globose; no involucre. Known species 390; world wide, the largest number in the tropics.

Polyporus, in botany, the typical genus of *Polypori*. Akin to Boletus, but the tubes do not separate from each other, or from the pileus. *P. destructor* and *P. hybridus* produce dry rot in wood; *P. officinalis* was admitted into old pharmacopœias. A species, apparently *P. fomentarius*, is used in India as a styptic and for amadou. Several species are considered edible.

Polypterus, in ichthyology, the typical genus of the *Polypteridæ*. There is but one species, *P. bichir*, confined to tropical Africa, found in the rivers flowing into the Atlantic, and in the Upper Nile. It attains a length of about four feet, and lives in the mud at the bottom of rivers, where it

Polypus

crawls by means of its fins. It is capable of swimming with great rapidity. The dorsal fin is broken into a succession of little finlets, varying in number from 8 to 18, according to the varieties of which there are several.

Polypus, a morbid growth attached to the interior of any of the mucous canals. It is generally a fleshy tumor with many branches. Polypi sometimes grow in the nose, larynx, heart, rectum, uterus and vagina. In zoölogy, in the plural, a class of radiated animals defined as having many prehensile organs radiating from around the mouth only.

Polysyndeton, the name given to a figure of speech by which the conjunctive particles of sentences are accumulated, contrary to usual custom, for the purpose of giving a greater emphasis to the terms connected by them, as when Schiller says, "And it waves, and boils, and roars, and hisses."

Polytechnic College, a coeducational institution in Fort Worth, Tex.; founded in 1891 under the auspices of the Methodist Episcopal Church, South; has grounds and buildings valued at over \$175,000; volumes in the library, 3,000; ordinary income, about \$37,000; average number of faculty, 25; average student attendance, 440.

Polytechnic Institute, an educational non-sectarian institute in Brooklyn, N. Y.; founded in 1854; has grounds and buildings valued at over \$425,000; scientific apparatus, etc., about \$95,000; volumes in the library, over 15,000; ordinary annual income, about \$145,000; average number of faculty, 75; average student attendance, 1,350; graduates, over 1,200.

Polytechnic School, an educational establishment in which instruction is given in many arts and sciences, more especially with reference to their practical application. The first polytechnic school was established by a decree of the French Convention, on Feb. 13, 1794, and was of great service to the country. Numerous schools of this class now exist in all parts of the United States, among them the Brooklyn Polytechnic, Worcester Polytechnic, Virginia Polytechnic, Drexel Institute in Philadelphia, Rose Polytechnic, in Indiana, etc.

Polythalamia, a group of Protozoa occupying compound chambered cells of microscopic size. In some instances each cell of the common shell presents only one external opening, but more commonly it is punctured with numerous minute pores or foramina, through which the animal can protrude filaments. Their remains constitute the bulk of the Chalk and Tertiary limestone.

Pomaceæ

Polytheism, the worship of many gods. It is not necessarily the same as idolatry, for gods may be adored without any image of them being made. In Sir John Lubbock's classification of religious beliefs, fetishism and totemism are polytheistic; the next stage in the ascending order, anthropomorphism, may or may not be so. No mention is made in Scripture of polytheism before the flood. It existed among the ancestors of Abraham in Ur of the Chaldees (Josh. xxiv: 2). The first commandment is leveled against it (Exod. xx: 3, Deut. v: 7). It was common at the time among the Canaanites (Deut. vi: 14, vii: 4). At many periods the Jews, high and low, lapsed into it (I Kings xix: 2; II Kings xvii: 16, 17; Ezek. viii: 3-18). Though some of the Greek and Roman philosophers may have risen above polytheism to conceive the unity of God, the masses of the people were polytheistic, as is the case with the ethnic nations today, though in some cases, as in that of India, pantheism underlies polytheism, and some apparent polytheists really believe all nature to be one God.

Polyzoa, in zoölogy, the name given by J. W. Thompson in 1830 to what Ehrenberg called Bryozoa. In 1841 H. Milne-Edwards united the Polyzoa, Brachiopoda, and Tunica in his group Molluscoida. It has been since shown that the latter belong to the Vertebrata, and the relation of the first two rested on a mistaken identification of parts. The Polyzoa appear to be closely related to the Sipunculoid Gephyræan worms, and are thus classified and characterized by Prof. E. Ray Lankester:

Sect. 1. Vermiformia.

Sect. 2. Pterobranchia.

Sect. 3. Eupolyzoa, with two sub-classes: (1) Ectoprocta (with two orders, *Phylactolaema* and *Gymnolaema*), and (2) Endoprocta.

The Polyzoa have cœlomata, with closely approximated mouth and anus. A variously modified group of ciliated tentacles is disposed around the mouth. They are without metameric segmentation, setæ, or paired outgrowths of the body wall.

Pomaceæ, Linnæus, 37th natural order, including Punica, Pyrus, Ribes; also appleworts, an order of perigynous exogens, alliance Rosales. Trees or shrubs, with alternate, stipulate leaves; flowers solitary, or in terminal cymes, white or pink. Petals five, unguiculate, inserted in the throat of the calyx, the odd one anterior. Stamens indefinite, inserted in a ring in the throat of the calyx. Ovaries from one to five more or less adherent. Fruit a pome, one- to five-celled, rarely 10-celled; seeds ascending, solitary. Found in the temperate parts of the Northern Hemisphere. Known genera 16, species 200. (Lindley.)

Pomade

Pomade, perfumed or fragrant ointment or composition for dressing the hair; pomatum.

Pombal, Sebastian Joseph de Carvalho e Mello, Marquis of, a Portuguese statesman; born May 13, 1699, at the castle of Soure, near Coimbra. In 1739 he was appointed ambassador in London, and six years later was sent to Vienna in a similar capacity. Just before Joseph I. ascended the throne of Portugal (1750), Pombal was appointed secretary for foreign affairs. Among his first acts was to reattach to the crown a number of domains that had been unjustly alienated. When the great earthquake happened at Lisbon in 1755 Pombal displayed great calmness and fertile resource, so that next year the king made him prime minister. He crushed a revolt instigated by the great nobles and the Jesuits, and in 1759 banished the latter from the kingdom. Then he abolished slavery in Portugal, set himself to establish good elementary schools, and published a new code of laws. Besides this, he effected the reorganization of the army, the introduction of fresh colonists into the Portuguese settlements, the establishment of an East India Company, and another for Brazil. The tyranny of the Inquisition was broken. Agriculture, commerce, and the finances were all improved. In 1758 he had been made Count of Oeyras, and in 1770 he was created Marquis of Pombal. On the accession of Joseph's daughter, Maria I. (in 1777), who was under the clerical influence, Pombal was deprived of his offices and banished from court, while many of his institutions were abolished. The peasantry always spoke of him as "The Great Marquis." He died in his castle of Pombal, May 8, 1782.

Pomegranate, the fruit of *Punica granatum*. Botanically viewed it is anomalous, consisting of two whorls of carpels, one placed above the other, the lower tier five in number, the upper being 5 to 10. The seeds have a pellucid pulpy covering. They are eaten.

Pomegranate Tree, *Punica granatum*, once believed to be the type of a distinct order, *Granateæ*, then placed by Lindley among *Myrtaceæ*, and by Bentham and Hooker transferred to *Lythraceæ*. It has oblong or lanceolate leaves, undotted, a leathery calyx, shaped like a top, with five to seven valvate lobes; and petals many, scarlet, white, or yellowish. A tree 15 to 25 feet high, a native of W. Asia and N. Africa. It forms woods in Persia. A decoction of the bark is a powerful anthelmintic, but not so good as fern root; the flowers are tonic and astringent; the bark

Pommier

of the fruit is used in leucorrhœa, chronic dysentery, etc., and the acrid juice in bilious fevers. The plant is sometimes used for hedges. Its bark is of use in tanning.

Pomerania, a province of Prussia, bounded by the Baltic, Mecklenburg, Brandenburg, and West Prussia; area, 11,622 square miles; pop. 1,684,326. The coast is low and sandy and lined by numerous lagoons. The chief islands along the coast are Rügen, Usedom, and Wollin. The interior is flat and, in parts, marshy. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are some rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. Domestic animals are numerous. The forests are of large extent. Fish is abundant. There are few minerals. Manufactures include woolen and other fabrics. A considerable general and transit trade is carried on. The center of trade is Stettin, which ranks as one of the chief commercial cities of Prussia. Pomerania appears to have been originally inhabited by Goths, Vandals, and Slaves. The present inhabitants are of Saxon stock. The first mention of it in history is in 1140. It long remained an independent duchy, and in 1637, on the extinction of the ducal family, it was annexed to Sweden. On the death of Charles XII. it was ceded to the electoral house of Brandenburg, with the exception of a part which subsequently was also obtained by Prussia. For administrative purposes it is divided into three governments, Stettin, Köslin, and Stralsund.

Pomeroy, Marcus Mills, "Brick Pomeroy," an American journalist and humorous writer; born in Elmira, N. Y., Dec. 25, 1833; was a journalist of La Crosse, Wis., and later of New York city, where he founded "Brick Pomeroy's Democrat," merged in 1887 into "Pomeroy's Advanced Thought." His chief publications are: "Gold Dust" (1872); "Brick Dust" (1872); "Perpetual Money" (1878). He died in Brooklyn, N. Y., May 30, 1896.

Pomfret. See PONTEFRACT.

Pommier, Victor Louis Amédée, a French poet; born in Lyons, France, in 1804. Among his writings are: "The Russian Expedition" (1827); "The Republic; or, The Book of Blood" (1836); "The Assassin" (1837); "Hell" (1835), a most realistic portrayal of the infernal regions as conceived by old-time orthodoxy; "Algeria and Conquering Civilization" (1848); "Death of the Archbishop of Paris" (1849); "Monologues of a Solitary" (1870). He died in 1877.

Pomona

Pomona, the Roman divinity of the fruit (*pomum*) of trees. She was beloved by several of the rustic divinities, as Sylvanus, Picus, and Vertumnus.



POMONA.

and a pruning knife in her right hand.

Pomona, the largest and most populous of the Orkney Islands; length from N. W. to S. E., 23 miles; extreme breadth, about 15 miles, but at the town of Kirkwall only about 2½ miles; area, 150 square miles. Pop. 17,165. It is extremely irregular in shape, and on all sides except the W. is deeply indented by bays and creeks. The surface is covered in great part by moor and heath, but good pasture is also to be found and in the valleys a good loamy soil occurs. The principal towns are Kirkwall and Stromness.

Pomona College, a coeducational institution in Claremont, Cal.; founded in 1887, under the auspices of the Congregational Church; has endowment of over \$295,000; grounds and buildings exceeding \$350,000 in value; scientific apparatus, etc., over \$40,000; ordinary income, about \$150,000; average number of faculty, 38; average student attendance, 500; volumes in the library, 11,000.

Pompadour, Jeanne Antoinette Poisson, Marchioness de, the mistress of Louis XV., in whose affections she succeeded Madame de Chateauroux; the daughter of a financier; born in 1720. At the age of 21 she was married to M. d'Etioles; first attracted the king's notice while he was hunting in the forest of Senart; appeared at court in 1745, under the title of Marchioness de Pompadour. She certainly used her influence with the king in promoting the progress of the fine arts, but her cupidity and

Pompeii

extravagance were unbounded; and many of the evils which oppressed France in the succeeding reign have been attributed to the



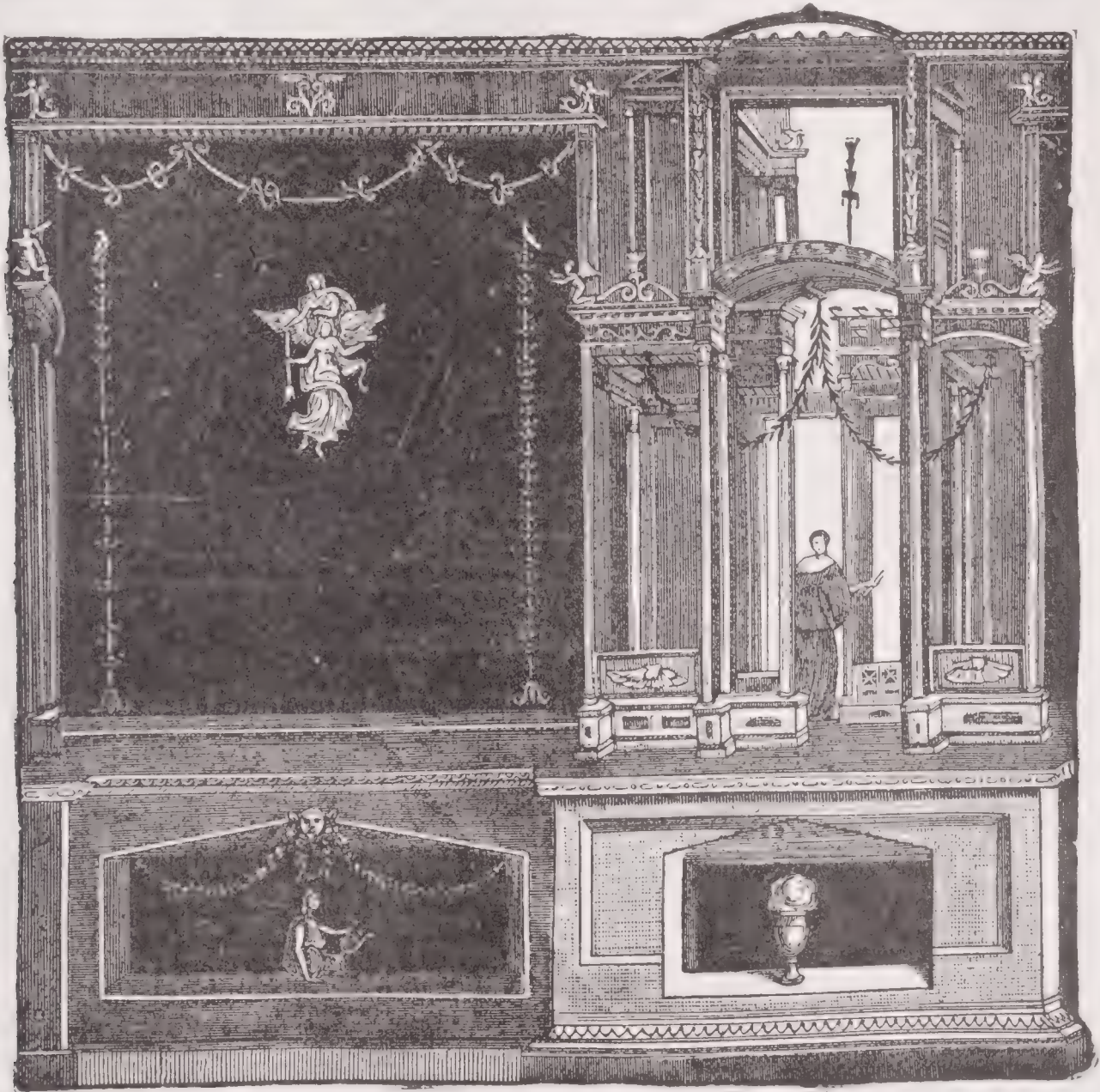
MARCHIONESS DE POMPADOUR.

power she possessed of filling the most important offices of the state with her favorites, whose measures were generally inglorious, both at home and abroad. She died in 1764.

Pompeii, a seaport at the mouth of the Sarnus, on the Neapolitan Riviera, founded about 600 B. C. by the Oscans, and after them, occupied by the Tyrrheno-Pelasgians, and by the Samnites, till these, about 80 B. C., were dispossessed by the Romans. From that time down to its destruction, A. D. 79, it became (with Herculaneum) a sort of Rome-super-Mare, frequented by the aristocracy, if not by Caligula and Nero, in whose honor it erected triumphal arches. Fed from the capital with every luxury and distinction, it included temples in which the inhabitants were encouraged to make costly sacrifices with all their adjuncts of festivity and banqueting; indeed, its public monuments, out of all proportion to its size, were in number and magnificence such as we can now but dimly estimate. On Feb. 5, A. D. 63, by an earthquake in the vicinity, these buildings were all but levelled with the ground, and some years elapsed ere the fugitive citizens recovered confidence enough to reoccupy and rebuild what was once Pompeii. Reconstruction was carried out with a haste and disregard of architectural law contrasting strongly with the earlier work—the Forum especially exhibiting the inferiority of its Roman to its Greek builders. Tawdriness replaced simplicity of decoration—the columns, capitals, and cornices being ornamented with reliefs in stucco picked out with parti-colored designs, while private houses, fantastically restored

and adorned, infringed every artistic or æsthetic canon to favor the grotesque style of the Decadence. Revolutionized as it was for the worse, the city, however, retained a good deal of Greek character and coloring, and had relapsed into more than its former

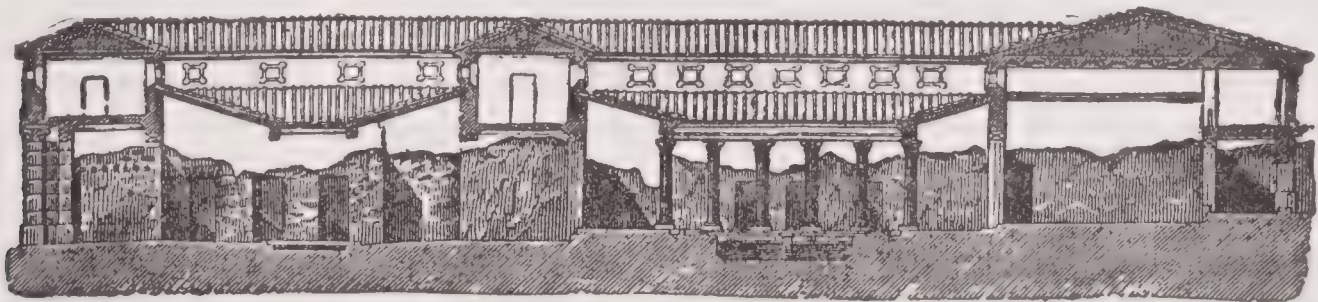
tently fell. Amid the impenetrable gloom that veiled land and sea, the panic of the citizens was aggravated by repeated shocks of earthquake, and for three days the flight continued till Pompeii was abandoned by all who could effect their escape. By the



POMPEII: A WALL DECORATION.

gaiety and licentiousness, when on Aug. 23 (or, more probably, on Nov. 23) 79, with a return of the shocks of earthquake, Vesuvius was seen to throw up a column of black smoke expanding like some umbrella pine of the neighborhood, till it assumed the pro-

fourth day the sun had partially reappeared, as if shining through a fog, and the more courageous of the citizens began to return for such of their property as they could disinter. Much was doubtless recovered or possibly stolen; but the desolation and dis-



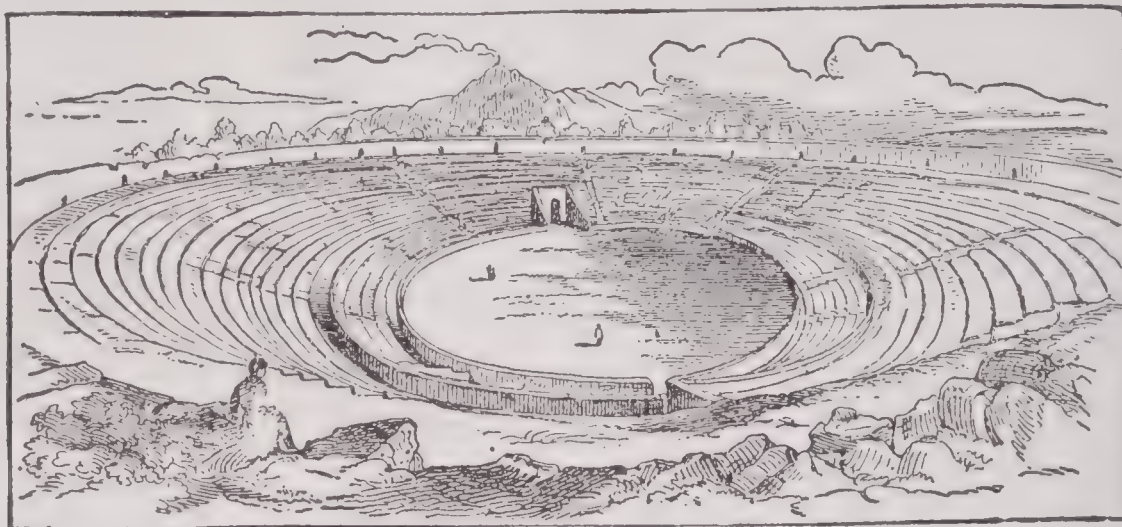
POMPEII: HOUSE OF PANSA.

portions of a great swarthy cloud, dense with ashes, pumice, and red-hot stones, settling down on the doomed cities with a force increased by the rain-torrents that intermit-

tress were such that the reigning emperor Titus organized relief on an imperial scale, and even undertook the clearing and rebuilding of the city. This attempt was soon

abandoned, and Pompeii remained a heap of hardened mud and ashes, gradually overgrown with grass—the wall of the great theater and the outline of the amphitheater alone marking its site—till 1592, when the architect Fontana, in cutting an aqueduct, came on some ancient buildings. These were long believed to mark the old Stabiæ; and only in 1748, under the Bourbon Charles

eight gates to which archæology has given names mostly conjectural. It had outgrown its walls, however, particularly toward the sea, and developed considerable suburbs. Its most important part—not quite one-half, including Forum, adjacent temples, and public buildings, two theaters with colonnades, amphitheater, and many private houses—has already been exhumed, and five main



POMPEII: AMPHITHEATER.

III., were they recognized as part of Pompeii. Unsystematic, unscientific excavations proceeded fitfully till 1860, when the Italian kingdom took in hand the unearthing of the city. This was carried out with admirable ingenuity, care, and success—all treasure-trove being vigilantly preserved, and an archæological record kept by the official excavators Fiorelli and Ruggiero, till now Pompeii possesses a distinction unknown to

streets made out and (provisionally) named. It has been divided, by official arrangement, into nine *regiones* (quarters), seven of them wholly or partially excavated, and each is subdivided into *insulæ* (blocks), bounded by four streets and provided each with a number, as are also the streets of each quarter. A *trottoir* borders the streets, which are straight and narrow—the broader 24 feet wide, the narrower 14 feet only—and ad-



A POMPEIIAN HOUSE.

it in the zenith of its imperial favor, and attracts the pilgrim from every clime for the object lessons it is unique in affording as to the public and private life of antiquity.

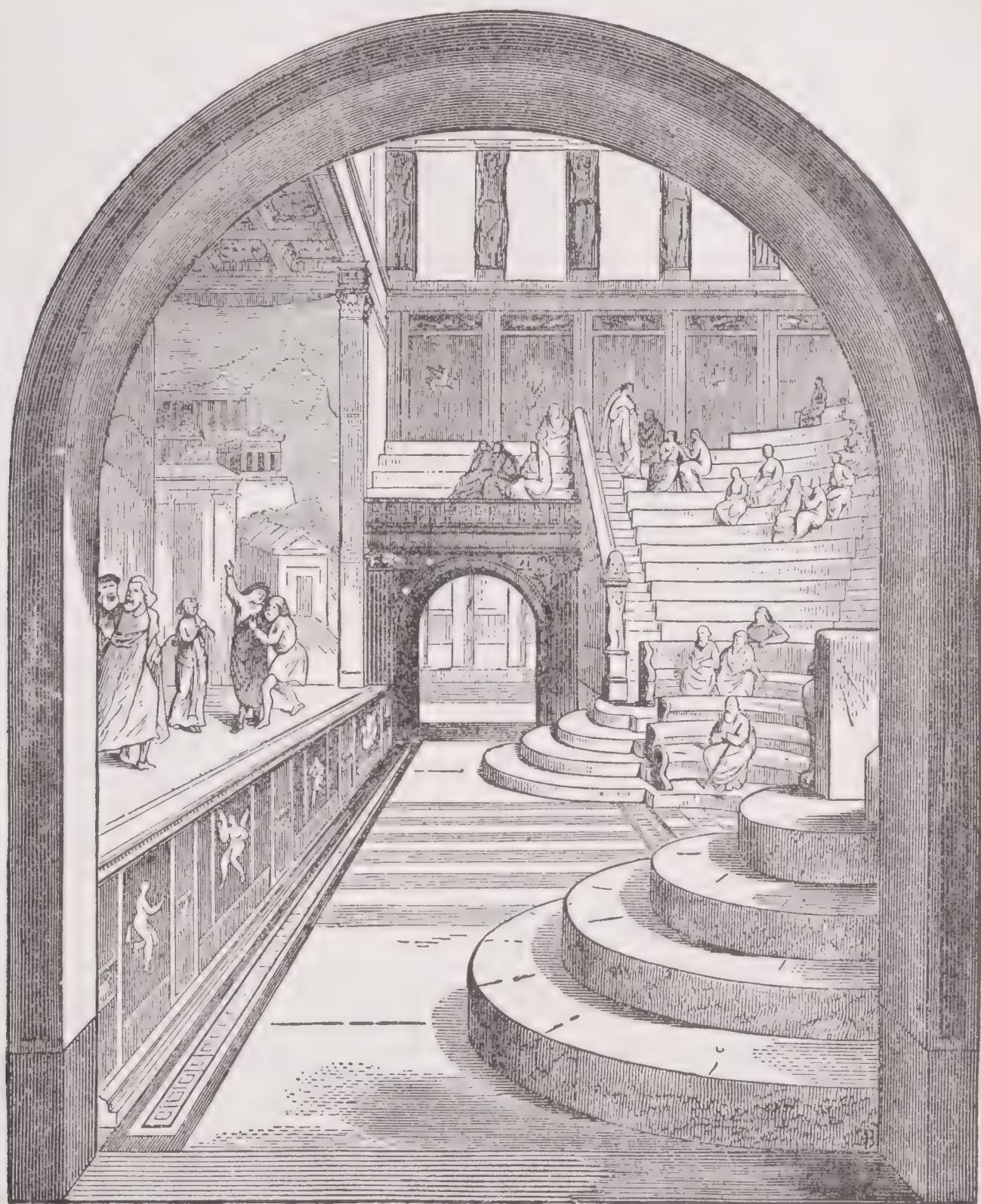
We cannot give more than the merest indication of the outline and distribution of Pompeii as now exposed. In form an irregular ellipse, extending from E. to W., in circumference about 2,843 yards, it had

mirably paved with polygonal blocks of lava. High stepping stones, placed mostly at the corners, lead across from one trottoir to another, and these retain the impressions of horses' hoofs, while in the causeway between the wagons have left deep ruts. The street corners are provided with fountains, ornamented usually with the head of a god or a mask. Notices painted in red letters,

and referring to municipal elections for which some particular candidate is recommended, occur frequently on the street walls, while trade-signs are few and far between. An occasional "phallus," to avert the evil eye, projects from over a doorway, and, much more common, one or two large snakes, emblems of the Lares, are to be seen. The stuccoed walls, to judge from

the *Graffiti* or roughly scratched drawings on them, were as tempting to the Pompeian gamin, as to our own. House construction consists mainly of concrete (rubble held together by cement) or brick, and sometimes of stone blocks, especially at the corners. Two-storied, sometimes three-storied houses are numerous, though the upper floors, built

sometimes a second room at the back, when he did not live on an upper floor or in another part of the town. Retail traffic must have been considerable at Pompeii, to judge from the number of those shops along the streets, which, when not so flanked, presented bare walls, occasionally enlivened with a painting. Only a personal visit can convey



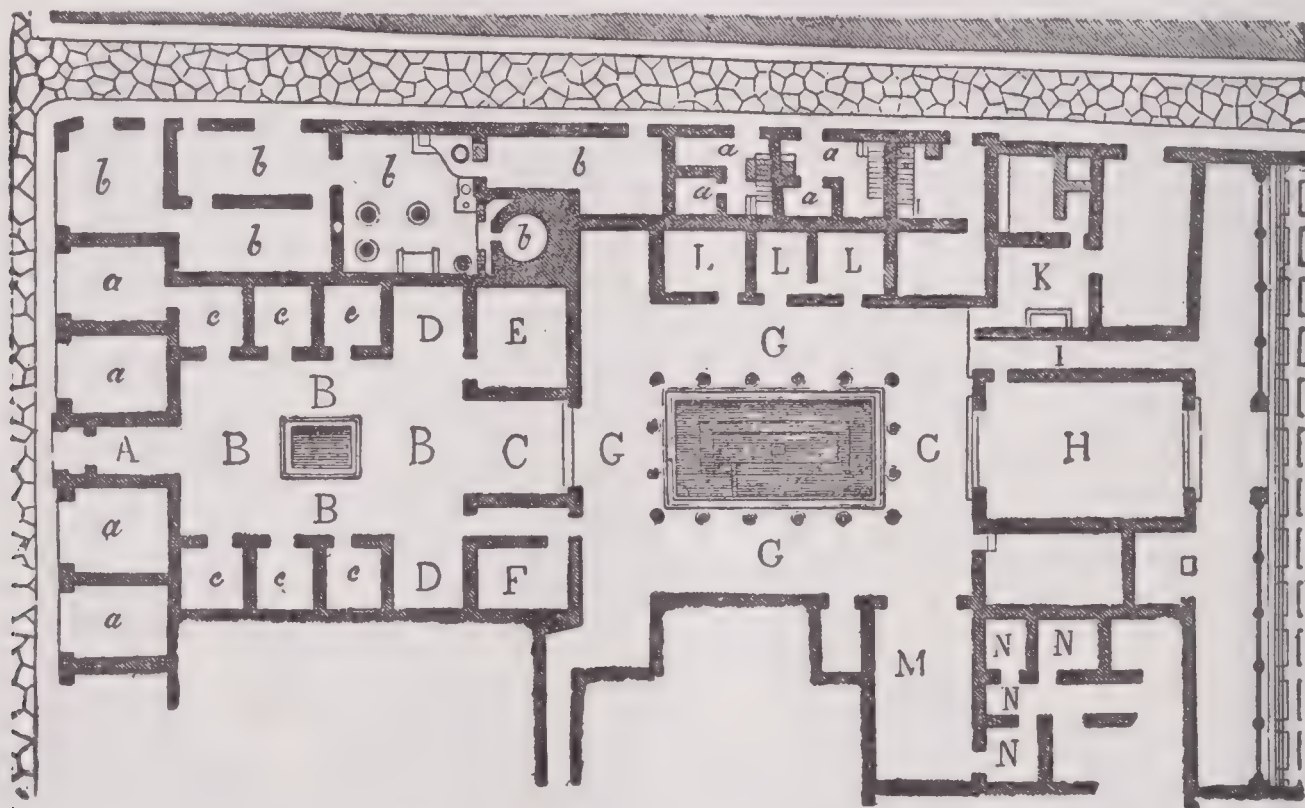
POMPEII: RECONSTRUCTED SMALL THEATER.

of wood, have been consumed by the eruption. Shops usually occupied the ground floors of dwelling-houses, on their street aspect, let out to merchants or dealers as at the present day, but not connected with the back part of the house. They could be separated from the street by large wooden doors, while inside they had tables covered with marble, in which earthen vessels for wine or oil were inserted. The shopkeeper had

an idea of the indoor life of the Pompeians, with whom the absence of glass, the fewness of the openings in the street aspect of the house wall, and the protection of these with iron gratings are among the points noted by the most casual visitor. Models of the interior of an entire house in its original form are given in the fuller guide-books to Pompeii—the feature that most strikes the Northerner being the smallness of the

rooms, particularly the bedrooms—quite intelligible, however, when he realizes that the Pompeians led an open-air life, and performed their toilets at the bath, public or private. As rebuilt after 63, Pompeii shows little marble, the columns being of tufa or brick cemented by mortar. A coating of stucco was laid over wall or column, and presented an ample field for ornamental painting. This must have given to Pompeii its bright, gay coloring, which, with its reds, blues, and yellows, on column and capital, on wall and partition, harmonize so well with the glowing sunlight of the S. On the center of the interior walls is generally seen a painting unconnected with the others—often of a nymph, or a genius,

on his return to Rome, 83 B. c., was hailed *Magnus*—the great—by Sylla; his audacious perseverance also procuring for him the honors of a triumph. On the death of Sylla, in 78 B. c., Pompey went as proconsul to Spain, where the plebeian war was continued by Sertorius, and after a four years' arduous struggle, he remained master of the field, his opponent having been betrayed and assassinated. He returned to Italy in time to give the finishing blow to the similar victories of Crassus, and in 70 B. c. Pompey and Crassus were elected consuls. In possession of this office, he restored the tribunitial power, and afterward dismissed his army, remaining at Rome as a private citizen. In the beginning of the year 67



POMPEII: PLAN OF HOUSE OF PANSA.

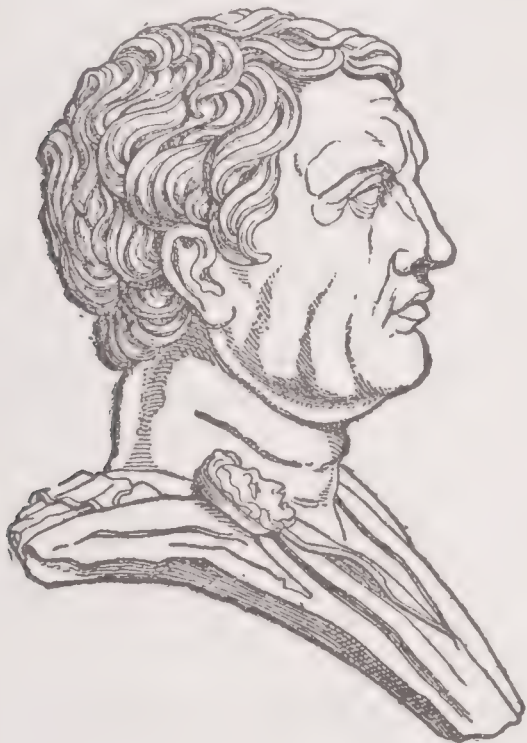
when not distinctly erotic in theme—typifying faithfully the voluptuous sensual life of this pleasure-haunt of paganism.

Pompey, Cneius Pompeius Magnus, son of Pompeius Strabo, a Roman general; born in 106 B. c. He distinguished himself against the enemies of the Roman senate, both within the state and without, and at last fell in the struggle against Cæsar for absolute power. The events which mark his career are briefly these: Like his father, under whom he commenced his military career, serving against Marius, Pompey ranged himself with the aristocratic party of the republic. He was in his 23d year only when he raised three complete legions, 60,000 men, at his own expense, and took the field in behalf of Sylla—at that juncture returning from his expedition against Mithridates. By his 26th year Pompey had defeated the remains of the Marian party in Cisalpine Gaul, Sicily, and Africa, and

B. c., he was intrusted with extraordinary powers, in order to destroy the lawless bands and the piratical adventurers who infested the coasts of the Mediterranean, and having effected this, he was made absolute dictator in the East, and superseded Lucullus in the command against Mithridates. The latter he completely routed in 66 B. c., and soon after becoming master of Asia Minor, pursued his conquests through Syria and Palestine as far as the Red Sea. For these services he obtained a third magnificent triumph at Rome, and, in 60 B. c. joined Cæsar and Crassus in the triumvirate, the former of whom gave him his daughter Julia in marriage. Succeeding events caused Pompey to draw closer to the senatorial party, and with him, as the representative of the patrician republic, went Cato, the honest enemy of the ambition of Cæsar. In 54 B. c. Julia died; in the year following, Crassus was slain in Asia; and now the hos-

Pompey's Pillar

tility between Cæsar and Pompey rapidly developed itself. The former having applied for the consulship, refused to present himself in Rome as a private citizen, and a decree of the senate declared him a public enemy unless he resigned his command. Instead of doing so, Cæsar crossed the Rubicon with his troops, 49 B. C., and Pompey, accompanied by Cato, Cicero, and other nobles of Rome, fell back on Greece, where the great battle of Pharsalia decided his fate. Pompey was advised to seek an asylum in Egypt, then ruled by a sovereign he had protected, Ptolemy XII. He was received with pretended friendship, but treacherously murdered as soon as he had stepped ashore, 48 B. C., and his head being cut off, it was sent to Cæsar, who turned away from it and could not restrain his tears. Pompey fell, and with him the republic of Rome, for want



POMPEY THE GREAT.

of the art of government; the brilliancy of early victories carried him to power, but the remembrance of his greatness in the field was a poor compensation for the anarchy that prevailed at Rome. CNEIUS, son of Pompey, who endeavored to carry on the war against Cæsar, was defeated and killed at Munda, 45 B. C. SEXTUS, the younger brother of Cneius, continued the war for 10 years, and rendered himself formidable as a naval commander; but he was at last defeated and killed by order of Antony, 35 B. C.

Pompey's Pillar, a celebrated column standing in the neighborhood of Alexandria, on an eminence about 1,800 feet S. of the walls. It is a monolith of red granite, and of the Corinthian order, stands on a pedestal. Its total height is 98 feet 9 inches; shaft, 73 feet; 29 feet 8 inches in circumference. On the summit is a circular depression for the base of a statue. The

Ponce de Leon

name popularly applied to it is an erroneous appellation given by old travelers; the Greek inscription on the base shows that it was erected by Publius, prefect of Egypt, in honor of the Emperor Diocletian, "the invincible"; and it is supposed to record the conquest of Alexandria by Diocletian, A. D. 296.

Pompholyx. See PEMPHIGUS.

Pompignan, Jean Jacques Lefranc, Marquis de (pōm-pēn-yäng), a French poet; born in Montauban, in 1709. His tragedy "Dido" (1734) had an extraordinary success; it was followed by "Zoraïde," tragedy; "The Farewell of Mars," comedy (1735); "Trip to Languedoc and Provence," narrative poem (1740). Some of his odes are works of consummate grace and art, *e. g.*, the "Ode on the Death of Jean Jacques Rousseau." He died in 1784.

Pomuk. See NEPOMUK.

Ponape, one of the Caroline Islands.

Ponce de Leon, Juan, a Spanish explorer, the discoverer of Florida; born in San Servas, Spain, in 1460; was a court page, served against the Moors, and in 1502 sailed with Ovando to Hispaniola, and became governor of the E. part of the island. In 1510 he obtained the government of Porto Rico, and had conquered the whole island by 1512, when he was deprived of his post. He then, broken in health, set out on a quest for the fountain of perpetual youth, and on March 27, 1512, found Florida, landing a little to the N. of where St. Augustine now stands. He secured the appointment of adelantado of the country, and, after staying on his way back to drive the Caribs out of Porto Rico, he returned in 1521 to conquer his new subjects; in this, however, he failed, and lost nearly all his followers. He retired to Cuba, and died there in July from the wound of a poisoned arrow. His remains and a monument are in San Juan de Porto Rico.

Ponce de Leon, Luis, a Spanish lyric poet; born in Granada, Spain, in 1527; entered the order of Augustin Friars, 1544, and in 1561 became Professor of Theology in the University of Salamanca. He suffered five years' imprisonment, by sentence of the Court of Inquisition, for his translation of the "Song of Songs" into Spanish, with commentary. Among his prose writings is a treatise on the "Names of Christ" (1583) and "The Perfect Wife" (1583); both books are still in popular use in Spain. His poems, almost exclusively of a religious character, are to be classed with the highest products of the lyric Muse of Spain. His translations in verse of some of the works of Vergil and Horace, of 40 of the Psalms, and of passages from Greek and Italian poets, are characterized by much

Poncho

spirit and grace of style. He died in Madrid, in 1591.

Poncho, a sort of cloak worn by the native Indians, and also by many of the Spanish inhabitants of South America. It resembles a narrow blanket with a slit in the middle, through which the head passes, so that it hangs down loosely before and behind, leaving the arms free. Hence, any garment for men or women resembling that described under the foregoing. Also, a trade name for camlet or strong worsted.

Pond, Frederick Eugene, an American journalist and author; born in Marquette co., Wis., April 8, 1856. He was among the first to urge the establishment of a National Sportsman's Association, and under the pen-name of "Will Wildwood" has published "Handbook for Young Sportsmen" (1876); "Memoirs of Eminent Sportsmen" (1878); and "Gun Trial and Field Records of America" (1885); "A Strike" (1897); etc.

Pond, John, an English astronomer; born in London, in 1767; studied at Cambridge; and succeeded Maskelyne as astronomer-royal in 1811. His name is identified with numerous improvements in the methods and instruments of observation; he translated Laplace's "System," and published a star catalogue and many valuable papers. He died Sept. 7, 1836.

Pondicherry, the chief of the French settlements in India; on the Coromandel coast; 53 miles S. by W. of Madras city; is divided into two parts by a canal, White (European) town being next the sea. It has handsome streets, a government house, a college, a lighthouse, and a cotton mill employing 1,500 hands, besides native dyeing establishments. Pop. (1907) 46,579. It exports chiefly oil seeds. The French colony of Pondicherry has an area of 115 square miles. Pop. 182,000. The governor of Pondicherry is governor-general of the French possessions in India. The French first settled here in 1674. The Dutch took the town in 1693, but restored it to the French in 1697. In 1748 Admiral Boscawen besieged Pondicherry for two months, but was compelled to raise the siege. Eyre Coote, however, took it in 1763 with reduced territory. It was once more taken by the English under Sir Hector Monro in 1778, and once more given back in 1783. In 1793 the English again repossessed themselves of it, but it was a third time restored to the French in 1816.

Pondoland, a district of Kaffraria, on the Natal frontier, South Africa, 65 miles long by 30 wide, was annexed to Cape Colony in 1884 and 1887, except East Pondoland, which was annexed in 1894. Total

Ponson du Terrail

area, 3,918 square miles; pop. (1904), 202,757.

Poniatowski, Joseph, Prince, a Polish general; born in Warsaw, Poland, in 1763, and when young entered the Austrian service, but when the Poles rose against Russia he quitted it, and joining his countrymen, fought with them under Kosciusko. On the defeat of this general, Poniatowski sought refuge in Vienna, till the French entered Warsaw in 1806, when he was appointed to the command of the Polish army which was to coöperate with the French against Russia. In 1812 Napoleon gave him the command of the 5th Corps of the Grand Army, which consisted almost entirely of Poles. In the subsequent battles he distinguished himself by his skill and bravery, and covered himself with glory in the retreat from Moscow. Napoleon estimated his services so highly, that shortly before the battle of Leipsic he created him a Marshal of France. After this disastrous battle, the French were flying in utter confusion over the Elster; the bridge was blocked up, prisoners were taken by thousands, and many who plunged into the stream perished. The whole of the rear guard fell into the hands of the allies, together with the King of Saxony and his whole court. Marshal Macdonald with difficulty gained the opposite bank, but the unfortunate Poniatowski was drowned in the attempt, Oct. 13, 1813.

Poniatowski, Stanislaus, Count de, father of Stanislaus Augustus, King of Poland, castellan of Cracovia, and a companion-in-arms of Charles XII., flourished in 1678-1762.

Ponsard, François, a French dramatist; borne in Vienne, France, June 1, 1814. His first venture in literature was made with a translation of Lord Byron's "Manfred" (1837). His "Lucretia" (1843), in the production of which on the stage of the Odéon the celebrated Rachel acted the leading rôle, was a brilliant success; it marked a reaction against romanticism. Among his other dramatic productions are: "Agnes de Méranie" (1846); "Charlotte Corday" (1850); "Ulysses" (1852); "Honor and Money" (1853), a fine satiric comedy; "The Bourse" (1856); "What Pleases Womankind" (1860), a trilogy, which had little success; "The Lion in Love" (1866); "Galileo" (1867). He died in Paris, July 13, 1867.

Ponson du Terrail, Pierre Alexis, a French romancer; born in Montmaur, France, July 8, 1829. He wrote an incredible number of works of fiction; among his works are: "Heritage of a Centenarian"; "Gown and Sword" (1857); "The Matrimonial Agency"; "Memoirs of a Man

of the World" (1861); "Nights at the Gilded House"; "The King of Navarre's Mistress" (1863); "The Great World's Bohemians" (1867); "Dr. Rousselle's Secret" (1869); "Aurora's Amours" (1870). He died in Bordeaux, Jan. 31, 1871.

Pont, Timothy, a Scotch geographer; son of Robert Pont (1527-1606), a celebrated Edinburgh minister; dates of birth and death unknown, but he graduated at St. Andrews in 1584, was minister of Dunnet in Caithness (1601-1608), and in 1609 subscribed for 2,000 acres of forfeited lands in Ulster. "He was," says Bishop Nicholson, "by nature and education a complete mathematician, and the first projector of a Scotch atlas. To that great purpose he personally surveyed all the several counties and isles of the kingdom; took draughts of 'em upon the spot, and added such cursory observations on the monuments of antiquity and other curiosities as were proper for the furnishing out of future descriptions. He was happily surpris'd by death"; but his collections were rescued from destruction and oblivion by Sir John Scott of Scotstarvet, and his maps at last appeared in Blaeu's magnificent "Geography of the World" (1654).

Pont-à-Mousson, a town of France, department of Meurthe-et-Moselle; on the Moselle, 18 miles N. N. W. of Nancy and 18 S. S. E. of Metz. There is a fine Gothic church of the 13th century dedicated to St. Martin. The former abbey of St. Mary is now a seminary. The town was the birthplace of Marshal Duroc, the friend of Napoleon.

Pontchartrain, Lake, in Louisiana, about 5 miles N. of New Orleans, is 40 miles long and 25 wide. It is navigated by small steamers, and communicates with the Gulf of Mexico. The drainage of New Orleans is carried into the lake through canals.

Pont du Gard. See GARD.

Pontecorvo, a city of Italy, province of Caserta, on the Garigliano river; 37 miles N. W. of Capua. It has an old cathedral and a castle. It was long attached to the States of the Church. Napoleon I. gave the title of Prince of Pontecorvo to Marshal Bernadotte, afterward King of Sweden.

Pontefract, or **Pomfret**, a market-town in the West Riding of Yorkshire, England; on an eminence near the influx of the Calder to the Aire, 13 miles S. E. of Leeds. It stands on the line of a Roman road, but seems to have arisen round its Norman castle, which, founded about 1076 by Ilbert de Lacy, was the scene of the execution or murder of the Earl of Lancaster (1322), Richard II. (1400), and Earl Rivers (1483), was taken in the Pilgrimage of

Grace (1536), and during the Great Rebellion sustained four sieges, being finally dismantled in 1649, after its capture by Lambert. There are two old churches, a town hall (rebuilt 1796), a market hall (1860), a grammar school of Edward VI. (1549), and large market gardens and nurseries, the growing of liquorice for the lozenges called "Pomfret cakes" being a specialty as old as about 1562. At Ackworth, 3 miles S., is a large Quaker school (1778). Pontefract, called Taddenesscylf in pre-Conquest times, seems to have received its present name between 1086 and 1135.

Pontiac, a celebrated Indian chief of the Ottawa tribe; born about 1712. He was the leader in Pontiac's War, and was killed in Illinois in 1769.

Pontiac's War, an Indian war of 1763 between the English settlers and garrisons on the frontiers, and a combination of the Delawares, Wyandots, Shawnees, Mingoes, Chippewas, and other Indian tribes, under the leadership of Pontiac. The war lasted two years and was marked by ferocious and bloody battles in which some garrisons were completely annihilated. An unsuccessful attack was made on Detroit in 1763.

Pontianak, capital of the W. division of Dutch Borneo, near the mouth of the river Kapuas, on the W. side of the island. It has some fortifications, and a lively trade.

Pontifex, a bridge builder; a title given to the more illustrious members of the Roman colleges of priests. Their number was originally five, the president being styled Pontifex Maximus. The number was afterward increased to nine, and later still to 15. After the time of Tiberius the office and title of Pontifex Maximus were bestowed, as a matter of course, on each emperor on his accession. It is now the title of the Pope.

Pontifical, one of the service books of the Church of Rome, in which are contained the several services, whether in the administration of sacraments or the performance of public worship, in which the bishop or a priest delegated by the bishop officiates. There were many such collections for the various national Churches; but that which is now in universal use throughout the Western Church is the "Pontificale Romanum," or "Roman Pontifical," first printed in 1485, revised under Clement VIII. in 1596, and repeatedly republished since that time. The "Pontifical" contains the services for ordinations, for religious professions and receptions of monks and nuns, consecrations, benedictions, as well as of the solemn administration by a bishop of those sacraments which are or-

Pontigny

dinarily administered by priests. Besides the prayers to be recited, the "Pontifical" also lays down the ceremonial to be observed.

Pontigny, a village of the French department of Yonne, 18 miles S. E. of Auxerre, with a famous Cistercian monastery, dating from the 12th century. It was the burialplace of St. Edmund of Canterbury. Here Thomas Becket found refuge in 1164-1166; as did Stephen Langton in the next century. The monastery was devastated by the Huguenots in 1567, and finally destroyed at the Revolution; but the church (mainly 1150-1170) is the most perfect Cistercian church in existence. To the shrine of St. Edmund (18th century) in this church came in 1874 a pilgrimage of English Roman Catholics.

Pontine Marshes, an extensive marshy tract of land in Italy, in the S. part of the Roman Campagna, extending along the shores of the Mediterranean for about 24 miles, with a mean breadth of 7 miles. The Romans, by the construction of the Appian way and by means of canals, laid a considerable part of them dry, and many of the Popes engaged in the drainage and reclaiming of the marshes. But notwithstanding all these labors, now completely abandoned, the air of this region is far from being salubrious, and the vast tract is inhabited by a scanty population of husbandmen and shepherds, who, if possible, spend only a part of the year here.

Pontmartin, Armand Augustin Joseph Marie, a French story writer; born in Avignon, France, July 16, 1811. In 1853 he commenced a series of "Literary Talks" in the "Gazette de France" which, collected, fill 30 volumes. Among his works are: "Recollections of an Old Lover of Music" (1878); "Medusa's Raft" (1872); "Recollections of an Old Critic"; "My Memoirs" (1885-1886); "Sins of Old Age" (1889); "Literary Episodes" (1890). He died in Avignon, March 29, 1890.

Pontoon, a floating vessel supporting the roadway timbers of a floating military bridge. They may be boats, water-tight cylinders of tin, or wooden frames covered with canvas, india-rubber, etc. Also, a barge or lighter of large capacity, used in careening ships, raising weights, drawing piles, etc., or capable, in pairs, of acting as camels. And a barge or flat-bottomed vessel furnished with cranes, capstans, and hoisting tackle, used in wrecking, in connection with a diving bell, or in raising submerged vessels. In hydraulic engineering, a water-tight structure which is sunk by filling with water, and raised by pumping it out, used to close a sluiceway or en-

Poodle

trance to a dock. It works in grooves in the dock walls, and acts as a lock gate.

Pontresina, a tourist center in the Swiss canton of Grisons, stands in the Upper Engadine, on the road connecting with the Bernina Pass, and is much frequented by Alpine climbers.

Pontus, in ancient geography, the N. E. province of Asia Minor, bounded N. by the Euxine Sea, W. by Galatia and Paphlagonia, S. by Cappadocia and part of Armenia, and E. by Colchis. It was originally governed by kings, and was in its most flourishing state under Mithridates the Great, who waged a long and celebrated war with the Romans, but was at length subdued by Pompey; after which Pontus became a province of the Roman empire. The geographer Strabo was born in Amasia, its capital; and one of its principal towns, Trapezus, still flourishes under the name of Trebizond.

Pontus Euxinus. See BLACK SEA.

Pony, a term applied to several sub-varieties or races of horses, generally of smaller size than the ordinary horses, and which are bred in large flocks and herds in various parts of the world, chiefly for purposes of riding and of lighter draught work. Among well-known breeds are the Welsh, Shetland, Iceland, Exmoor, New Forest, and Scotch Highland.

Poodle, a breed of dog whose origin dates from the beginning of the 17th century or earlier, as many pictures of that time contain portraits of poodles. The poodle is one of the few breeds of dogs which has not been properly appreciated and cultivated in Great Britain and the United States. From his great intelligence and cleverness in learning tricks, he was generally adopted as a circus or "trick dog"; but this fact, instead of making for his credit, has caused the poodle to be treated with contempt. On the Continent, however, the large variety of poodle has been universally used as the humbler sportsman's companion, and he combines the properties of a land as well as a water dog. The poodle varies considerably in his appearance, and attempts have been made to divide the breed into several sections, such as the large and small variety, or the corded coated and fleecy coated variety, as also into black Russian and white German poodles; but none of these divisions are very clearly defined. The large black Russian poodle is much the most handsome and agile specimen of the race, and may be easily trained to retrieve. The small white poodle is only fit for a house dog, but is extremely clever. For some unknown reason the poodle has always been clipped in a peculiar manner; with the exception of a

few tufts, his body and hindquarters are entirely bare, while the coat on his shoulders sometimes grows to an enormous length. On the Continent the poodle is left with his natural coat during the winter, a much more humane plan than the habit of keeping him shaved in all seasons.

Pook, Samuel Hartt, an American naval constructor; born in Brooklyn, N. Y., Jan. 17, 1827; was graduated at the Portsmouth Academy, N. H., in 1843; and was articled as a shipwright. He settled in Boston as a naval architect and designed many merchant and war vessels; entered government service, when the Civil War broke out; superintended the construction of the iron-clad "Galena"; and at the close of the war entered the navy as assistant naval constructor; was promoted naval constructor in 1871 and served till his retirement in 1899. He died March 30, 1901.

Pool, a game played on a pool table. The pool table is constructed exactly the same as a billiard table, excepting the fact that it has four or six apertures in the rails, through one of which it is necessary to drive a ball to make a count, the ball so driven being propelled from the force imparted by being struck by the cue ball. A pyramid of 15 balls is placed at a given spot on the table and the game is ended, if there are but two players, when eight balls are pocketed, as that is a majority of the 15 object balls. When three or more players participate the game is ended when it is impossible for the player who has the least number of balls to get enough to equal his next highest competitor.

Also, an arrangement between several competing lines of railway, by which the total receipts of each company are pooled, and distributed *pro rata* according to agreement. A combination of persons contributing money to be used for the purpose of increasing or depressing the market price of stocks, with a view to the settlement of differences. Also the stock or money contributed by a clique to carry through a corner. Also, a gambling enterprise participated in by several persons; the joint stake or fund contributed by such persons. In rifle shooting, firing for prizes on the arrangement that each competitor pays a certain sum for each shot, and all the proceeds of the day, after deduction of the necessary expenses, are divided among the winners.

Pool, Maria Louise, an American novelist; born in Rockland, Mass., in August, 1841. At one time she was connected with the New York "Tribune." Her best known works are: "In Buncombe County"; "A Vacation in a Buggy" (1887); "Tenting at Stony Beach" (1888); "Rowena in Boston" (1892); "In a Dike Shanty"

(1896). She died in Rockland, May 19, 1898.

Poole, a seaport of Dorsetshire, England; 5 miles W. of Bournemouth and 30 E. of Dorchester. It stands on the N. side of Poole Harbor (7 by 4¼ miles), an irregular inlet, formed by the projection of the "isle" of Purbeck, almost dry at low water, and having four tides a day. On Brownsea or Branksea Island, just within the narrow entrance to the harbor, is a castle, dating from the time of Henry VIII. Poole itself has an old town hall (1572), a guildhall (1761), a town house (1822), considerable shipping, some yacht building, and a large trade in potter's and pipe clay. The men of Poole were great fighters, as buccaneers, smugglers, and Cromwellian soldiery. There was "Arripay," or Harry Page, who about 1400 kept the seas against France and Spain; and there was William Thompson, who, with a man and a boy, captured a French privateer in 1695.

Poole, John, an English playwright; born in 1792; wrote the immortal "Paul Pry," first produced at the Haymarket in 1825, and several other farces and comedies, such as "Turning the Tables," "Deaf as a Post," "'Twould Puzzle a Conjuror," "The Wife's Stratagem," etc. Besides these theatrical pieces he wrote also the satirical "Little Pedlington" (1839), "The Comic Sketch Book" (1859), "Comic Miscellany" (1845), "Christmas Festivities" (1845), and other books of a light, humorous kind. He died in London, Feb. 5, 1879.

Poole, Matthew, an English author; born in York, about 1624; educated at Emmanuel College, Cambridge, and held from 1648 till the passing of the Act of Uniformity (1662) the rectory of St. Michael le Querne in London. His principal work was his "Synopsis of Biblical Criticism" (1669-1676), in which the opinions of 150 Biblical critics were summarized. In his "English Annotations on the Holy Bible" he had only reached Isaiah lviii.; but the work was completed by his friends (1685). Effective contributions to the Romish controversy were "The Nullity of the Romish Faith" (1666) and "Dialogues Between a Popish Priest and an English Protestant" (1667). He died in Amsterdam, Holland, in October, 1679.

Poole, William Frederick, an American bibliographer; born in Salem, Mass., Dec. 24, 1821; was a librarian of Boston, Cincinnati, and Chicago. His chief work is the celebrated "Index to Periodical Literature," which he initiated, and of which in its greatly expanded later form he was co-editor with W. L. Fletcher. Among his other works are "The Battle of the Dictionaries" (1856), and "Cotton Mather

and Salem Witchcraft" (1869). He died in Evanston, Ill., March 1, 1894.

Poonac, the substance left after cocoa-nut oil is expressed from the nuts, used as manure and for feeding stock.

Poona, or **Puna**, a town of British India, 119 miles S. E. of Bombay; the military capital of the Deccan and the seat of the government of the presidency during the last half of the year. The city is surrounded by gardens, but its streets are mostly narrow or crooked, and the houses poor. The ruins of the peshwa's palace, burned in 1827, still remain. Under the peshwas the city was the capital of the Mahratta princes and power; it was occupied and annexed by the British in 1818. Here have been built the Deccan College and the College of Science, the latter for training civil engineers, a normal school and normal college, a high school, and other educational establishments. The Europeans live chiefly at the cantonments, N. W. of the city. The natives manufacture cottons and silks, gold and silver jewelry, ivory and grass ornaments, and clay figures. Pop. 153,320. The district has an area of 5,348 square miles. Pop. 900,621.

Poon Wood, the wood of the poon tree (*Calophyllum inophyllum* and *Calophyllum angustifolium*), a native of India. It is of a light, porous texture and is much used in the East Indies in shipbuilding for planks and spars. The Calcutta poon is preferred to that of other districts. Poon seed yields an oil called *dilo*, poon-seed oil, etc.

Poop, the aftermost, highest part of the hull. Also, a deck over the after part of a spardeck, abaft the mizzen.

Poor Clares, the minoresses, the second order of St. Francis of Assisi, who received St. Clare, the founder of the order, at the convent of Portiuncula, in 1212. The rule, which was exceptionally severe, was mitigated by Pope Urban IV. in 1264, and the order then separated into two branches: The Urbanists, who followed the mitigated, and the Clarisses, who adhered to the original rule. In 1436 St. Colette brought back a number of houses in France and Flanders to the observance of the rule of St. Francis.

Poore, Benjamin Perley, an American author; born in Newbury, Mass., Nov. 2, 1820; spent several years abroad, and devoted much time to research in French history. On his return he became active in journalism, and for 30 years was Washington correspondent of the Boston "Journal." His works include "The Rise and Fall of Louis Philippe" (1848); "Early Life of Napoleon" (1851); "Reminiscences of Sixty Years" (1886). He died in Washington, D. C., May 30, 1887.

Poor Priests, a name given to, or as-

sumed by, the Lollard clergy of the 14th and 15th centuries, who wandered about the country holding what would now be called "missions," without the sanction of the bishop of the diocese.

Poor's Roll, in the practice of the law of Scotland, the list of poor persons who are litigants, but unable to pay the expenses of litigation, and therefore are allowed to sue *in formâ pauperis*. This privilege is only granted on production of a certificate by the minister of the parish and two elders, setting forth his circumstances to their own knowledge and his general poverty. Notice is given of this to the adverse party, who is allowed time to inquire and oppose the application. Where the applicant is not in Scotland he may make a declaration of poverty before a magistrate — *e. g.*, in Ireland. When the court is satisfied of the poverty, the next thing is for the court to remit the matter to the reporters appointed by the Faculty of Advocates, who report whether there is a *probabilis causa* — *i. e.*, a plausible cause of action. If this report is made it is considered conclusive, and the party is put on the poor's roll. This warrant remains in force for two years, and during that time the pauper is exempt from all fees of court, and has the gratuitous services of counsel and agents, whose names appear on a list made by the faculty of advocates and other legal bodies. This provision for enabling paupers to carry on litigation is unknown in England or Ireland; for though a party may also be allowed there to sue *in formâ pauperis*, no provision is made by the court for giving him the gratuitous services of counsel and attorney. There is also a list of poor's counsel in the High Court of Judiciary. By an old custom a panel charged with murder may claim the gratuitous services of the Dean of Faculty.

Poot, Huibert Cornelis, a Dutch poet; born in Abtswoud, South Holland, Jan. 29, 1689. His countrymen called him "The Hesiod of Holland." He published "Miscellaneous Poems" (1716; to which succeeded a second volume, 1728, and a third, 1735). He died in Delft, Dec. 31, 1733.

Pope, a bishop of the Christian Church; specifically, the Bishop of Rome. The term Papa, or Papas (father), has always been given by the Greek Church to presbyters, like the term Father now applied to a Roman priest. In the early centuries the bishops received the same title till, in a council held at Rome in 1076, at the instance of Gregory VII. (Hildebrand), it was limited to the Bishop of Rome. Holding that office, being also Metropolitan of Rome and primate, and claiming to be the earthly head of the Church universal, it is in the last named capacity that the term

Pope is held to be specially applicable. It has been a matter of controversy among Roman Catholics whether the authority of the Pope was above or below that of the General Council. That of Pisa (1409), claiming to be a General Council, deposed two rival Popes, and appointed a third; but the two former repudiated the authority of the council, and exercised their functions as before. The Council of Constance (1414-1418) also deposed two rival Popes and elected one. In 751 Pope Zachary being consulted as to the right of the warlike French to depose their incompetent king, Childeric, and raise Pepin, the able mayor of the palace, to the sovereignty, sanctioned the proceeding. Pepin, in return, became his friend, and handed over to the Church the Exarchate and the Pentapolis. Charlemagne, in 774, confirmed and enlarged the gift. In 1076 or 1077 the Princess Matilda, daughter of Boniface, Duke of Tuscany, made the Holy See heir to her extensive possessions. Thus arose "the States of the Church" which figured on the map of Europe as an independent sovereignty till Sept. 20, 1870, when the troops of Victor Emmanuel, King of Italy, entered Rome, nominally in the interests of order, and took possession of the palace for the Italian kingdom. On July 2 and 3, 1871, the seat of government was removed thither. It still continues the metropolis. No interference took place with the Pope's purely spiritual authority, but much with his temporal possessions and revenues.

A Papal Election.—When the death of the reigning Pope is imminent the Dean of the College of Cardinals summons his colleagues to the residence of the dying pontiff. Prayers are ordered in all the Roman churches. Immediately after the death of the Pope the cardinal camerlingo knocks thrice on the door of the bed chamber where the body lies. Getting no answer, he enters and with a silver mallet taps thrice on the forehead of the dead man, calling him three times by name. The announcement of the Pope's death is then publicly made and the cardinal camerlingo takes an inventory of the property in the palace and seals up the dead pontiff's papers. Nine days is the official period of mourning. On the ninth day the remains, which have been lying in state in St. Peter's, are accorded a magnificent public funeral and are placed in the temporary receiving tomb, there to remain till the next Pope dies, when they are interred in the crypt of St. Peter's. Then all is ready for the conclave which meets to elect a new Pope.

The cardinals from all over the world gather in the palace, and to preserve secrecy, the quarters occupied by them are isolated, every door, window, and other

aperture, being walled up. After attending the mass of the Holy Ghost, the cardinals march in solemn and splendid procession to the chapel, from which at the ringing of a bell all but the cardinals are ejected. Then the great doors are locked on the outside and from that time on the conclave has no ostensible connection with the outside world. Two dumb waiters in which the food for the cardinals is delivered are the only means of communication. But ambassadors of Roman Catholic powers and others interested in the election of a particular candidate communicate with the cardinals by secreting notes in the heart of an orange or pasting them under the label of a bottle of wine. About 10 o'clock of the second morning the cardinals proceed to the Sistine Chapel, if the conclave is to be held in the Vatican, and the balloting begins. Three cardinals are chosen to count the ballots and three to collect the ballots of those whom sickness detains in their cells. On the upper part of the ballot each cardinal writes his own name, below it the name of his candidate, and at the bottom some verse of Scripture. The ballots are then folded and sealed, so that only the name of the candidate voted for is in sight.

There are three methods of election recognized — by inspiration, by compromise, and by election. The first is when all the cardinals, as if moved by one spirit, proclaim one candidate as Pope unanimously and viva voce. The second is when a committee is appointed to decide on a compromise between rival candidates. The third and usual method is when balloting is continued till some candidate is successful. It is not necessary that a cardinal or even a member of the priesthood be chosen as Pope. In fact, at least two laymen, John XIX. (1024) and Adrian V. (1276) have been elected Pope. Two ballots a day are taken till one candidate receives two-thirds of all the votes. Then the successful candidate is adorned with the pontifical robes, and the Sacred College performs the first act of homage to the new sovereign. Then the masons tear down the wall which has stopped up one of the balcony windows and the cardinal dean announces the election to the waiting multitude. Then follows various public ceremonies, and finally — most impressive and splendid of all — the coronation of the new Pope. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. The Pope should be addressed as "Your holiness."

The following is a table of the Popes, according to the Roman "Notizie," with the dates of the commencement of their pontificates. The names printed in italics are those of anti-Popes:

Pope

St. Peter A. D. 42	St. Vitalianus 657
St. Linus 66	Adeotatus 672
St. Anacletus 78	Donus or Domnus
St. Clement I. 91	I. 676
St. Evaristus 100	St. Agathon 678
St. Alexander I. . . . 108	St. Leo II. 682
St. Sixtus I. 119	St. Benedict II. . . . 684
St. Telesphorus 127	John V. 685
St. Hyginus 139	Conon — <i>Theodo-</i>
St. Pius I. 142	<i>rus</i> ; <i>Paschal</i> 686
St. Anicetus 157	St. Sergius I. 687
St. Soterus 168	John VI. 701
St. Eleutherius 177	John VII. 705
St. Victor I. 193	Sisinnius 708
St. Zephyrinus 202	Constantine 708
St. Callixtus I. 202	St. Gregory II. . . . 715
St. Urban I. 223	St. Gregory III. . . . 731
St. Pontianus 230	St. Zachary 741
St. Anterus 235	Stephen II (died
St. Fabian 236	before consecra-
St. Cornelius 250	tion) 752
St. Lucius I.— <i>No-</i>	Stephen III. 752
<i>vatianus</i> 252	St. Paul I.— <i>Con-</i>
St. Stephen I. 253	<i>stantine</i> ; <i>Theo-</i>
St. Sixtus II. 257	<i>phylactus</i> ; <i>Philip</i>
St. Dionysius 259	Stephen IV. 768
St. Felix I. 269	Adrian I. 722
St. Eutychianus 275	St. Leo III. 795
St. Caius 283	Stephen V. 816
St. Marcellinus 296	St. Paschal I. 817
(See vacant 3 years	Eugenius II. 824
and 6 months.)	Valentinus 827
St. Marcellus I. . . . 308	Gregory IV. 827
St. Eusebius 310	Benedict III.— <i>An-</i>
St. Melchisedec or	<i>astadius</i> 855
Miltiades 311	St. Nicholas I. . . . 858
St. Sylvester I. 314	Adrian II. 867
St. Marcus 336	John VIII. 872
St. Julius I. 337	Marinus I., or Mar-
Liberius 352	tin II. 882
St. Felix II. (some-	Adrian III. 884
times reckoned an	Stephen VI. 885
Anti-pope) 355	Formosus 891
St. Damascus I. . . . 366	Boniface VI.
St. Siricius 384	reigned only 18
St. Anastasius I. . . . 398	days) 896
St. Innocent I. 402	Stephen VII. 896
St. Zosimus 417	Romanus 897
St. Boniface I.—	Theodorus II.
<i>Eulalius</i> 418	— <i>Sergius III.</i> 898
St. Celestine I. 422	John IX. 898
St. Sixtus III. 432	Benedict IV. 900
St. Leo I. the Great 440	Leo V. 903
St. Hilary 461	Christopher 903
St. Simplicius 468	Sergius III. 904
St. Felix III. 483	Anastaius III. . . . 911
St. Gelasius I. 492	Lando 913
St. Anastasius II. . . . 496	John X. 914
St. Symmachus 498	Leo VI. 928
St. Hormisdas —	Stephen VIII. 929
<i>Lawrence</i> 514	John XI. 931
St. John I. 523	Leo VII. 936
St. Felix IV. 526	Stephen IX. 939
Boniface II.— <i>Dio-</i>	Marinus II., or
<i>scorus</i> 530	Martin III. 943
John II. 533	Agapetus II. 946
St. Agapetus I. 535	John XII.— <i>Leo</i>
St. Sylverius 536	<i>VIII</i> 956
Vigilius 537	Benedict V. 964
Pelagius I. 555	John XIII. 965
John III. 560	Benedict VI. 972
Benedict (I.) Bo-	Donus or Domnus
nosus 574	II. 974
Pelagius II. 578	Benedict VII. 975
St. Gregory I. the	John XIV.— <i>Boni-</i>
Great 590	<i>face VII.</i> 983
Sabinianus 604	John XV. 985
Boniface III. 607	Gregory V.— <i>John</i>
St. Boniface IV. . . . 608	<i>XVI.</i> 996
St. Deusdedit 615	Sylvester II. 999
Boniface V. 619	John XVI. or
Honorius I. 625	XVII. 1003
(See vacant 1 year	John XVII. or
and 7 months.)	XVIII. 1003
Severinus 640	Sergius IV. 1009
John IV. 640	Benedict VIII.—
Theodorus I. 642	<i>Gregory VI.</i> 1012
St. Martin I. 649	John XVIII. or
St. Eugenius I. . . . 654	

Pope

XIX 1024	pacy removed to
Benedict IX. (de-	Avignon) 1305
posed) — <i>John</i>	(See vacant 2 years
XX. 1033	and 3 months.)
Gregory VI.— <i>Syl-</i>	John XXII. 1316
<i>vester III.</i> 1045	Benedict XII.—
Clement II. 1046	<i>Nicholas V.</i> at
Damasus II.— <i>Ben-</i>	<i>Rome</i> 1334
<i>dict IX.</i> attempts	Clement VI. 1342
to resume the	Innocent VI. 1352
throne 1048	Urban V.— <i>Clem-</i>
St. Leo IX. 1049	<i>ent VII</i> 1362
Victor II. 1055	Gregory XI.
Stephen X. 1057	throne restored
Benedict X. 1058	to Rome) 1370
Nicholas II. 1058	Urban VI. 1378
Alexander II.— <i>Ho-</i>	Boniface IX.— <i>Ben-</i>
<i>norius II.</i> 1061	<i>dict XIII.</i> at
Gregory VII. (Hil-	<i>Avignon</i> 1380
debrand) —	Innocent VII. 1404
<i>Clement III.</i> . . . 1073	Gregory XII. 1406
(See vacant 1 year.)	Alexander V. 1409
Victor III. 1086	John XXIII. 1410
Urban II. 1088	Martin V.— <i>Clem-</i>
Paschal II. 1099	<i>ent VIII.</i> 1417
Gelasius II.— <i>Greg-</i>	Eugenius IV.— <i>Fe-</i>
<i>ory VIII.</i> 1118	<i>lix V.</i> 1431
Callixtus II. 1119	Nicholas V. 1447
Honorius II.— <i>Ce-</i>	Callixtus III. 1455
<i>lestine II.</i> 1124	Pius II. 1458
Innocent II.— <i>An-</i>	Paul II. 1464
<i>acletus II.</i> ; <i>Vic-</i>	Sixtus IV. 1471
<i>tor IV.</i> 1130	Innocent VIII. . . . 1484
Celestinus II. 1143	Alexander VI. . . . 1492
Lucius II. 1144	Pius III. 1503
Eugenius III. 1145	Julius II. 1503
Anastasius IV. . . . 1153	Leo X. 1513
Adrian IV. (Nich-	Adrian VI. 1522
olas Breakspear,	Clement VII. . . . 1523
an Englishman) . . 1154	Paul III. 1534
Alexander I I I.—	Julius III. 1550
<i>Victor V.</i> ; <i>Pas-</i>	Marcellus II. 1555
<i>chal III.</i> ; <i>Callix-</i>	Paul IV. 1555
<i>tus III.</i> ; <i>Inno-</i>	Pius IV. 1559
<i>cent III</i> 1159	St. Pius V. 1566
Lucius III. 1181	Gregory XIII. 1572
Urban III. 1185	Sixtus V. 1585
Gregory VIII. 1187	Urban VII. 1590
Clement III. 1187	Gregory XIV. 1590
Celestinus 1191	Innocent IX. 1591
Honorius III. 1216	Clement VIII. . . . 1592
Gregory IX. 1227	Leo XI. 1605
Celestinus IV. 1241	Paul V. 1605
(See vacant 1 year	Gregory XV. 1621
and 7 months.)	Urban VIII. 1623
Innocent IV. 1243	Innocent X. 1644
Alexander IV. 1254	Alexander VII. . . . 1655
Urban IV. 1261	Clement IX. 1667
Clement IV. 1265	Clement X. 1670
(See vacant 2 years	Innocent XI. 1676
and 9 months.)	Alexander VIII. . . . 1689
Gregory X. 1271	Innocent XII. 1691
Innocent V. 1276	Clement XI. 1700
Adrian V. 1276	Innocent XIII. . . . 1721
Nicholas III. 1277	Benedict XIII. 1724
John XIX. or XX.	Clement XII. 1730
or XXI. 1276	Benedict XIV. 1740
Martin IV. 1281	Clement XIII. . . . 1758
Honorius IV. 1285	Clement XIV. 1769
Nicholas IV. 1288	Pius VI. 1775
(See vacant 2 years	Pius VII. 1800
and 3 months.)	Leo XII. 1823
St. Celestinus V. . . 1294	Pius VIII. 1829
Boniface VIII. . . . 1294	Gregory XVI. 1831
Benedict XI. 1303	Pius IX. 1846
Clement V. (pa-	Leo XIII. 1878
	Pius X. 1903

Pope, Alexander, an English poet; born in London, England, May 21, 1688. His father was a London merchant and a devout Catholic. Soon after his son's birth the father retired to Binfield, near Windsor. Pope was small, delicate, and much deformed. His education was a desultory one. He picked up the rudiments of Greek and Latin from the family priest, and was suc-

Pope

cessively sent to two schools, one at Twyford, the other in London. He was taken home at the age of 12, received more priestly instruction, and read so eagerly that his feeble constitution threatened to break down. Before he was 15 he attempted an epic poem, and at the age of 16 his "Pastorals" procured him the notice of several eminent persons. In 1711 he published his poem the "Essay on Criticism," which was followed by "The Rape of the Lock," a polished and witty narrative poem founded on an incident of fashionable life. His next publications were "The Temple of Fame," a modernization and adaptation of Chaucer's "House of Fame"; "Windsor Forest," a pastoral poem (1713); and "The Epistle of Eloisa to Abelard" (1717). From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the "Iliad" (completed in 1720) being wholly



ALEXANDER POPE.

from his pen, the "Odyssey" only half. The pecuniary results of these translations showed a total profit of nearly \$45,000. In 1728 he published his "Dunciad," a mock heroic poem intended to overwhelm his antagonists with ridicule. It is distinguished by the excessive vehemence of its satire, and is full of coarse abuse. This was followed by "Imitations of Horace" (among the most original of his works), and by "Moral Epistles" or "Essays." His "Essay on Man" was published anonymously in 1733, and completed and avowed by the author in the next year. This work is distinguished by its poetry rather than by its reasonings, which are confused and contradictory. In 1742 he added a fourth book to his "Dunciad," in which he attacked Colley Cibber, then poet laureate. Pope was vain and irascible, and seems to have been equally open to flattery and prone

Popinjay

to resentment; yet he was kind-hearted and stanch to his friends, among whom he reckoned Swift, Arbuthnot, and Gay. His great weakness was a disposition to artifice to acquire reputation and applause. As a poet, no English writer has carried further correctness of versification. A large number of his letters were published in his own lifetime. He died in Twickenham, May 30, 1744.

Pope, John, an American military officer; born in Louisville, Ky., March 16, 1822; was graduated at the United States Military Academy in 1842, and entered the engineers. He served in Florida (1842-1844), and in the Mexican War, and was brevetted captain for gallantry. He was afterward employed in exploring and surveying in the West, till the outbreak of the Civil War, when he was appointed Brigadier-General of volunteers. In 1861 he drove the guerillas out of Missouri; in 1862 he captured New Madrid in March, and was made Major-General, commanded the Army of the Mississippi in the operations against Corinth, and was assigned to the command of the Army of Virginia, with the rank of Brigadier-General, U. S. A. For 15 days in August he faced Lee, but was defeated at the second battle of Bull Run, on the 29th and 30th. He then requested to be relieved, and was transferred to Minnesota, where he kept the Indians in check. He held various commands till 1886, when he retired. In 1882 he became Major-General, U. S. A. Pope attributed his defeat at Bull Run to the conduct of Gen. Fitz-John Porter, who was tried by court-martial and cashiered; but this verdict occasioned much controversy, in which General Grant ultimately took Porter's side, and in 1886 the latter was restored to the army. Pope died in Sandusky, O., Sept. 23, 1892.

Popery, the religion of the Church of Rome. No Popery! in English history, a political cry, first raised against granting equal political and social rights to Roman Catholics, and afterward against the real or fancied encroachments of the Roman Church. It was raised during the Gordon riots (1780), against Catholic Emancipation in 1829, the Maynooth grant in 1845, and the reestablishment of the Roman hierarchy with territorial titles in 1850. In the latter case the cry led to the passing of the Ecclesiastical Titles Act (1851), which was practically inoperative, and was repealed in 1871. "Punch's" cartoon (March 22, 1851) depicted Lord John (afterward Earl) Russell as the naughty boy who chalked up "No Popery" and ran away.

Popinjay, a parrot; a figure of a bird put up as a mark for archers to shoot at ("papingo" being another Scotch form for

Popish Plot

this sense). The green woodpecker is also sometimes called popinjay.

Popish Plot, in English history, an alleged plot made known by Titus Oates in 1678. He asserted that two men had been told off to assassinate Charles II., that certain Roman Catholics whom he named had been appointed to all the high offices of the State, and that the extirpation of Protestantism was intended. On the strength of his allegation, various persons, including Viscount Stafford, were executed. Gradually evidence arose that the whole story was a fabrication, and that the people who had been capitally punished were all innocent. On May 8, 1685, Oates, who had received a pension of \$10,000 for his revelations, was convicted of perjury, heavily fined, pilloried, and publicly flogged. He survived, making several attempts to exploit new plots, but deservedly despised, till 1705.

Poplar, a genus of *Salicaceæ*. Catkins drooping, their scales usually jagged; disk cup-shaped, oblique, entire. Males, stamens 4 to 30; females, stigmas, two to four-cleft; capsule two-celled, loculicidal. Known species 18, from the N. temperate zone. Two, *Populus alba*, the great white poplar or abele, and *P. tremula*, the trembling poplar or aspen, are indigenous. *P. nigra*, the black poplar, is only naturalized. The first is a large tree with downy, but not viscous buds, roundish, cordate, lobed-toothed leaves, glabrous above, downy and very white beneath, ultimately becoming glabrous on both sides. It grows in moist places and mountain woods. The timber is white, soft, and used only for coarse work. The bark is said to be useful in strangury. Sir Joseph Hooker considers *P. canescens*, the gray poplar, to be only a sub-species of it. For the second species, see ASPEN. *P. nigra* has viscid buds, leaves rhombic deltoid, or suborbicular, finely crenato-serrate; at length becoming glabrous. It grows in moist places, on river banks, etc. The wood is light, and not very valuable. It is used for carving, or burnt for charcoal, and the bark employed for tannin. *P. monilifera* is the black Italian poplar, *P. fastigiata*, the Lombardy poplar, and *P. canadensis*, the Canadian poplar. The buds of *P. nigra*, the Himalayan *P. balsamifera*, *P. candicans*, etc., are besmeared in winter with a resinous, balsamic, bitter, aromatic exudation, called tacamahac, considered to be diuretic, and antiscorbutic. The bark of *P. euphratica* is given in India as a vermifuge. The poplar occurs in the Cretaceous rocks of North America, the Eocene of Bournemouth, and the Miocene of Continental Europe.

Poplin, a silk and worsted stuff, watered, figured, brocaded, or tissue. Originally an all-silk French goods. Irish pop-

Poppy

lins have a silk warp and worsted weft, and in the common grades cotton or flax is mixed with the silk.

Popocatepetl ("smoking mountain"), a volcano about 40 miles S. E. of the city of Mexico. It rises in the form of a cone to a height of 17,784 feet above the sea-level. No eruption has been recorded since 1540; it still smokes, however. It is often scaled and in and around its crater (5,165 feet in diameter, and nearly 1,000 deep) a good deal of sulphur is obtained.

Poppy, a genus of plants of the natural order *Papaveraceæ*, having a calyx of two (or rarely three) sepals, which very soon fall off; a corolla of four (rarely six) petals; numerous stamens seated on a receptacle; the stigma crowning the ovary, without a



OPIUM POPPY.

a, whole plant; b, flowers and leaf; c, ripe capsule; d, seed and section of seed enlarged.

style, and in the form of 4 to 20 rays; the capsule opening by pores under the persistent stigma, imperfectly divided into cells by partitions as numerous as the rays of the stigma, but which do not reach the center, and the seeds extremely numerous. There are numerous species of poppy, mostly natives of Europe and Asia, some of them found even in very N. regions, but most of them in the warmer temperate parts. They are herbaceous plants, annual, biennial, or perennial, mostly sprinkled with bristly hairs. They have a white milky juice; a disagreeable narcotic smell, particularly when bruised; pinnatifid or bipinnatifid

leaves; more rarely jagged or toothed leaves; and large showy flowers, which readily become double by cultivation. The capsules are curious from the manner in which they fling out their seeds when the plant is shaken by the wind; each capsule being somewhat like a round or oval pepper box, with holes, however, not in the top, where rain might get in by them, but under the projecting rim. By far the most important species is that known as the opium poppy (*P. somniferum*), also called the white poppy and the oil poppy. But the same species is important on account of the bland fixed oil of the seeds, and is much cultivated as an oil plant. Poppy oil is as sweet as olive oil, and is used for similar purposes. It is imported into Great Britain and the United States in considerable quantities from India. The poppy is also extensively cultivated for it in France, Belgium, and Germany. The use and manufacture of this oil were for a long time, during the 18th century, strictly prohibited in France, from a mistaken notion that it must partake of the narcotic properties of the milky juice of the plant. The seed, however, contains no opium or any narcotic principle, and was well known to the ancients as a pleasant article of food, fit to be eaten by itself or with bread; some German cakes have poppy seed plentifully sprinkled on the top. The oil expressed from it is perfectly wholesome, and is much used in France and elsewhere as an article of food. It is believed that one-half of the oil used for cooking and otherwise for alimentary purposes in France is of this kind. The seeds yield about 40 per cent. of oil, and the oil cake is useful for manure or for feeding cattle. The oil is sometimes used by painters and by soap boilers; but it is not good for burning. In the cultivation of the poppy for oil the seed is often sown in autumn, where the severity of winter frosts is not to be feared; in more N. parts it is sown in spring, and sometimes the seed is scattered on the top of the snow with which the ground is covered. Being very small it needs little or no harrowing. Early sowing is favorable to the size of the plant and the abundance of produce. Hoeing and thinning are advantageous. An open but rich soil is best for the poppy; and a sheltered situation is necessary, as in exposed situations much of the seed is scattered by the wind. The poppy does not exhaust the land so much as colza, rape, and some other oil plants.

Harvesting ought to begin when one-fourth of the capsules of each plant are open. It is accomplished by pulling the plants in such a manner as not to shake the seed out of the capsules, and tying them in sheafs, which are placed together in an erect or slightly sloping position, till the ripen-

ing of the capsules is completed, when the seed is taken out by shaking the capsules into a tub or on a cloth, great care being used to prevent any earth from the roots from getting mixed with them. Some farmers in Flanders sow poppies in alternate rows with carrots. The variety of poppy chiefly cultivated as an oil plant has flowers of a dull reddish color, large oblong capsules, and brownish seeds; but the white-flowered variety, with globular capsules and white seeds, is also used. The Oriental poppy (*P. orientale*), a native of Armenia and the Caucasus, a perennial species, is often planted in gardens on account of its very large, fiery-red flowers. Its unripe capsules have an acrid, almost burning taste, but are eaten by the Turks, and opium is extracted from them. A variety with double flowers is cultivated in flower gardens, under the name of carnation poppy. Among the ancients the poppy was sacred to Ceres.

Poppy Head, a generic term applied to the groups of foliage or other ornaments placed on the summits of bench ends, desks, and other ecclesiastical woodwork in the Middle Ages.

Popular Songs. The popularity of a song can never be foretold any more than that of a book. So much depends on the humor of the people who first hear it, on the singer who first offers it to the public, on the sentiment expressed and other details that its success is as uncertain as a throw of the dice. The first step in the history of a song is to get it to the ears of a publisher. If he consents to listen and is pleased to accept it the author is bound by a contract in consideration of a per cent. of the net price of every copy, sold, to relinquish all claim to right, title and interest in it. The manuscript is then sent to a professional arranger of music, who looks it over and rearranges the accompaniment to what, in his judgment, is the best for general piano purposes, and then the song is printed. Usually about 5,000 copies are struck on very thin paper for free distribution among the singing profession on the stage. The giving of professional copies and orchestra parts to all singers of some standing is considered a very effective method of pushing a new song before the public. If the song seems to please the professional people, the publisher will print perhaps 1,000 copies to be sent out to the "trade" all over the country. Perhaps some popular singer may be induced to "feature" it, in his tour and this will give it prestige. Then copies of it are sent to the music halls, boy singers are sometimes paid to sit up in the gallery and join in the chorus, and men are hired to keep up the applause and various other "tricks of the trade" are resorted to. Soon it is

Popular Sovereignty

whistled about the streets and sung by strolling singers, while a little later it could be heard from the street organ and in the phonograph. A few songs have made the fortune of their authors, some are forgotten almost as soon as produced, while the majority of those written never see the printing press.

Popular Sovereignty, in United States history, a name given to the doctrine that the principle of slavery "should be kept out of the national legislature and left to the people of the confederacy in their respective local governments." While many of the Northern Democrats upheld this doctrine, the Southern element bitterly opposed it, Calhoun maintained that a man's right to his property, even though it be in slaves, must everywhere be upheld, so that he could take his slave into any territory regardless of the wishes of the inhabitants thereof. He nicknamed the doctrine "squatter" sovereignty. Douglas, its chief supporter, maintained that it was the basis of the Compromise of 1850, and in the Kansas-Nebraska Bill another attempt to apply it was made. But when it became evident that this doctrine meant the admission of all future territories as free, the interpretation was strained so as to bring it within Calhoun's declaration, on the ground that a territory could not manifest its intentions on the subject till it was ready to be admitted as a State, or in other words, not through its territorial government. A disagreement on the subject led to the withdrawal of a part of the Democratic National Convention which nominated Douglas in 1860.

Population, (1) the act or process of populating or peopling. (2) The inhabitants of a country, district, town, etc., collectively. (3) The state of a country with respect to the number of its inhabitants; populousness.

The population of the earth according to race, revised to 1911 by John Bartholomew, F. R. G. S., was as follows:

Race and Location.	Number.
Indo-Germanic or Aryan, in Europe, Persia, etc.	625,000,000
Mongolian or Turanian, in greater part of Asia.....	630,000,000
Semitic or Hamitic in North Africa and Arabia	65,000,000
Negro and Bantu, in Central Africa. Hottentot and Bushmen, in South Africa	150,000,000
Malay and Polynesian, in Australasia and Polynesia	150,000
American Indian, in North and South America	35,000,000
	15,000,000
Total.....	1,520,150,000

Population of the United States. See CENSUS.

Population, Center of. See CENTER OF POPULATION.

Porcelain

Porbeagle, a fish of the Lamnidæ family of sharks. Three species have been described; the best known is *Lamna cornubica*, which occurs in the N. Atlantic, and frequently strays to the British coasts. It attains to a length of 10 feet, and feeds chiefly on fishes. The porbeagle has two dorsal fins, a wide mouth, lanceolate teeth, and very wide gill openings.

Porcelain, a fictile material intermediate between glass and pottery, being formed of two substances, fusible and infusible, the latter enabling it to withstand the heat necessary to vitrify the former, thus producing its peculiar semi-translucency. The infusible material is alumina, called kaolin; the fusible substance is felspar, and is called pe-tun-tse, both Chinese terms. There are two kinds, hard and soft (*pâte*



PORCELAIN MARKS.

dure and *pâte tendre*); the hard body has more alumina and less silex and lime. Oriental porcelain is of two kinds, ancient and modern; the latter class includes imitations and reproductions. The manufacture began in China between 185 B. C. and A. D. 87, and reached its perfection during the Ming dynasty (1368-1644). The rarest Chinese wares are of the Tsin dynasty A. D. (265-419), the Soui (581-618), and the Thang (618-907)—forms virtually extinct except as copies. The Tcheou porcelain (954-959) is so valued that fragments are worn as personal ornaments. Ware of the Song dynasty (960-1279) is also highly prized. Porcelain came by trade into Persia and Egypt, and was known in Syria in the 12th century. Marco Polo in the 13th century described the Chinese method of manufacture from personal observation. First imported into Europe by the Portuguese in 1520. In Japan the porcelain manufacture began before 27 B. C., with a whiter body and more brilliant glaze than that of the Chinese. It is doubtful if it was ever

Porcelain Crab

made in Persia. In Europe, Boettcher, a Saxon chemist, found kaolin while seeking the philosopher's stone; and Augustus II., Elector of Saxony and King of Poland, established and placed under his control the famous Meissen factory at the castle of Albrechtsburg in 1710; 40 years later 700 men were employed. In Vienna, Stölzel, who escaped from Meissen in 1720, began the Austrian factory, which in 1785 employed 500 men; another was established in Berlin by Frederick the Great. During the 18th century, works were begun in Russia, Holland, Denmark, Spain, Portugal, Switzerland, and Italy. In France, soft porcelain was made at St. Cloud in 1695. Comte de Brancas-Lauraguan, in 1758, found kaolin, near Alençon, and porcelain was made at St. Yrieux, near Limoges. The Sèvres manufactory was first established at Vincennes in 1740, and moved to Sèvres in 1756. In France, the manufacture of soft porcelain extends from 1695 to 1770, after which date the hard body of Sèvres takes its place. In England, William Cookworthy, a chemist of Plymouth, found kaolin at Tregonning, near Helstone, in Cornwall, and his patent of 1768 was worked at Plymouth for two or three years, when the works were removed to Bristol. At Chelsea and Bow soft porcelain had been made. These two were transferred to Derby in 1770 and 1776. Bristol had a soft body works in 1753; its best period was from 1774 to 1778. Worcester porcelain dates from 1751; its best period ended with 1783. Large quantities of porcelain are produced in the United States. About Trenton, N. J., is the seat of the industry. See POTTERY.

Porcelain Crab (*Porcellana*), a name for certain crustacea, typical of the family *Porcellanidæ*, small smooth crabs. So called from their smooth, polished shell.

Porcellanite, a very hard, impure, jaspidaceous rock, frequently met with in the immediate vicinity of intrusive eruptive masses. In most cases porcellanite is simply a highly baked and altered argillaceous rock—shales being frequently converted into porcellanite along their line of junction with an igneous rock.

Porch, a covered entrance to a building; a covered approach or vestibule to a doorway. When a row of columns is added it becomes a portico. In some old churches the porches are of two stories, the upper being termed a parvis.

Porch, The, the School of the Stoics, so called because Zeno, the philosopher and founder of the sect, gave his lectures in the Athenian picture-gallery, called the *stoa poikile*, or painted porch.

Porcia, an ancient Roman lady, a daughter of Cato of Utica. She first married M. Bibulus, Cæsar's colleague in the consul-

Porcupine

ship (59 B. C.), by whom she had three children. Bibulus died in 48 B. C., and in 45 B. C., she married M. Brutus, who afterward became the assassin of Cæsar. After the death of Brutus she put an end to her life.

Porcupine, the popular name for any individual of the genus *Hystrix* or the family *Hystriidæ* (divided into two groups, Hys-



PREHENSILE-TAILED PORCUPINE.

tricina and Synetherina, or two sub-families, *Hystriidæ* and *Sphingurina*, the first group or sub-family containing the old world, or true porcupines, and the second those peculiar to the new). The common procupine (*H. cristata*) may be taken as a type of the true porcupine. It is found in the S. of Europe, and the N. and W. of Africa, is about 28 inches long, exclusive of the tail, about four inches. It is somewhat heavily built, with obtuse head and short limbs. The head, fore quarters, and under surface are clothed with short spines, intermixed with hairs, crest on head and neck, hind quarters covered with long



PORCUPINE: HYSTRIX CRISTATA.

sharp spines, ringed with black and white, and erectile at will. They are but loosely attached to the skin and readily fall out, a circumstance which probably gave rise to the belief that the animal was able to project them at an enemy. It is a purely vegetable feeder, and lives in holes in the rock, and burrows in the ground. The hairy-nosed porcupine is *H. leucura* (or *hirsutirostris*) from Syria, Asia Minor, and

Porcupine Crab

India; and the brush-tailed porcupines belong to the genus *Atherura*. They have long tails, tipped with peculiar flattened spines.

Porcupine Crab, *Lithodes hystrix*, a native of Japan. The carapace is triangular, and, like the limbs, thickly covered with spines. It is dull and sluggish in its movements.

Porcupine Fish (*Diodon hystrix*), a fish of the order *Plectognathi*, found in the tropical seas. It is about 14 inches long, and is covered with spines or prickles.

Porcupine Grass (*Triodia* or *Festuca irritans*), a brittle Australian grass which it is proposed to utilize in the manufacture of paper. See SPINIFEX.

Porcupine Wood, the outer portion of the trunk of the cocoanut palm, a hard, durable wood, which, when cut horizontally, shows beautiful markings resembling those of porcupine quills.

Pordenone, Regillo Da, or Il (so called from his birthplace, Pordenone, his true name being Giovanni Antonio Licinio), a painter of the Venetian school; born about 1484. He executed many works for his native place; some also for Mantua, Vicenza, and Genoa; but his greatest works were for Venice. Specimens of his works are to be found in many of the principal galleries of Europe. He died in Ferrara in 1540.

Porgy, Pogy, or Paugie, *Pagrus argyrops*, an important food fish found on the coast of the United States. It attains a length of 18 inches and a weight of about four pounds.

Porifera ("pore-bearing"), a term occasionally employed to designate the sponges.

Porism, in geometry: (1) A corollary. (2) A name given by the ancient geometers to a class of propositions having for their object to find the conditions that will render certain problems indeterminate or capable of innumerable solutions. It partakes of the nature both of a problem and of a theorem, without being exactly either.

Pork, the flesh of swine; one of the most important and widely used species of animal food. Pork is coarser and ranker than beef or mutton, but when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. The abundance and digestive quality of its fat renders it a suitable diet for cold climates. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of

Porphyrite

pork. Pork contains less fibrine, albuminous and gelatinous matter than beef or mutton, and is indigestible to anyone who is weak and debilitated. In the form of bacon, however, when well smoked and carefully prepared for the table, it acts as a stimulant to the stomach and is especially relished for breakfast. In the United States, prominently in the West, the pork-packing industry is one of the greatest factors of wealth. The immense establishments at Chicago, Kansas City, Omaha, St. Louis, Indianapolis, Cincinnati, and other cities, represent many millions of dollars invested in this branch of trade and commerce. In the packing season of 1897-1898 the number of hogs used in the cities mentioned was respectively: Chicago, 6,747,265; Kansas City, 3,184,386; Omaha, 1,570,050; St. Louis, 1,238,810; Indianapolis, 988,559; Cincinnati, 635,143. In the same season the aggregate number of hogs passing through Western establishments was 20,000,000, which came out in three and a third billion pounds of lard, pork, ribs and hams. The largest previous total was in the year 1896-1897, when 17,000,000 hogs were packed in the West, yielding 2,912,000,000 pounds of product. For the hogs packed in 1897-1898, \$175,000,000 was paid, an increase of \$40,000,000 over the cost of the hogs packed in the preceding year. The growth of the export trade in hog products is shown by comparison in the total values of the years 1863 and 1898, the total value of the exports in the former year being \$38,748,625 against that of \$110,000,000 for 1898. In the first four months of the latter year the exports of hog products equaled 54 per cent. of the grain and flour exports, and 60 per cent. of the cotton exports.

Porkopolis, a slang sobriquet for the city of Cincinnati, O.

Porosity, the quality or state of being porous or of having pores; porousness; specifically, that property of matter in consequence of which its particles are not in absolute contact, but are separated by pores or intervals; the opposite to density.

Porphyrio, a genus of *Rallidæ*, sub-family *Gallinæ*, with 14 species, chiefly Oriental and Australian, but occurring in South America, in Africa, and in the S. of Europe. Bill short, strong, high; the base dilated into a flat plate; culmen arched; nostrils large, basal covered by a membrane, naked; feet very large, toes without lateral membrane, claws large and slightly curved. In habits they resemble the water hen, but are larger and more stately birds; bill and legs red, general plumage metallic blue.

Porphyrite, or **Porphyryte**, a name used by some petrologists for the porphyritic orthoclase rocks which are free from

quartz. Some, however, include varieties in which the orthoclase constituent is more or less replaced by oligoclase. Many porphyritic dolerites have been also included under this name. By the presence of hornblende it often approaches the composition of a syenite, with which it is frequently associated.

Porphyrius, a Neo-Platonic philosopher; born in Batanea, Syria, A. D. 233; was a disciple first of Longinus, then of Plotinus, whose works he edited, and whom he succeeded as master of a school of philosophy at Rome. He wrote a "History of Philosophy," to which probably belongs the extant "Life of Pythagoras." Some fragments of his work against the Christian religion—condemned to the flames by the Emperor Theodosius II. in 453—are preserved in the writings of his adversaries. We have his tractate "On Abstinence from Animal Food"; also his "Homeric Questions," in 32 chapters; his "Epistle to Marcella" on the right conduct of life; his letter to the Egyptian priest Anebon in condemnation of magic and theurgy; "Introduction to Philosophy," in which the question of realism and nominalism is first mooted; "On Deriving a Philosophy from Oracles"; and "On the Cave of the Nymphs." He died in Rome 304 A. D.

Porphyrogenitism, the principle of succession in royal families, and especially among the Eastern Roman emperors, by virtue of which a younger son, if born "in the purple" that is, after the succession of his parents to the throne, was preferred to an older son born previous to such succession.

Porphyry, a term originally applied to a rock having a purple colored base, with inclosed individual crystals of a felspar. It is still used by some petrologists as a generic name for all rocks consisting of a felsitic base, with felspar crystals. Rocks of varied mineralogical composition, origin, and of various colors, having however, been included under this name, most petrologists use it in its adjectival form only. Thus, any rock in which crystals of felspar are individually developed, irrespective of the mineralogical composition of the whole, is said to be porphyritic.

Porpoise, the *Phocæna communis*, and any species of the genus; loosely applied by sailors to any of the smaller cetaceans. The common porpoise, when full grown, attains a length of about five feet. The head is rounded in front, and the snout is not produced into a beak. The external surface is shining and hairless, dark grey or black on the upper parts, under pure white. It is gregarious in habit, and is often seen in small herds, frequenting the coasts rather than the open seas. It often ascends rivers. It is found on the coasts of Scandinavia,

and ranges as far N. as Baffin Bay and as far W. as the coast of the United States. S. its range is limited, and it is unknown in the Mediterranean. It feeds on fish, and was formerly esteemed as an article of food. Its only commercial value now is derived from the oil obtained from its blubber, and its skin, which is used for leather and shoe laces; but "porpoise-hides" are ordinarily obtained from *Delphinapterus leucas*, the beluga, or white whale.

Porpora, Nicolo, an Italian singer; born in Naples in 1689; was the celebrated pupil of the no less celebrated Alessandro Scarlatti. In early life he left home, and composed and brought out operas with great success in Vienna, Venice, Dresden, and several other continental cities. He afterward became one of the principal masters in the conservatory at Venice, and late in life retired to Naples, where he died in great poverty at the age of 82. Porpora was particularly fortunate as a singing master; and among his most celebrated pupils were Farnelli, Mingotte, and Caffarelli, besides many other dramatic vocalists. His operas are now but little known, and his powers of composition are best exhibited in his religious works.

Porridge, a kind of dish made by boiling vegetables in water with or without meat; broth, pottage, soup; or a food made by slowly stirring oatmeal or similar substance in water or milk while boiling, till it forms a thickened mass. It is generally eaten with milk, sugar, or molasses, or stewed fruit.

Porsenna, or **Porsena**, a celebrated leader and king of Etruria, who declared war against the Romans because they refused to restore Tarquin to his throne. At first successful, he would have entered the gates of Rome had not Horatius Cocles stood at the head of a bridge and resisted the fury of the whole Etrurian army, while his companions behind were cutting off the communication with the opposite shore. This act of bravery astonished Porsenna; but when he had seen Mucius Scævola, who had entered his camp with the intention of murdering him, burn his hand without emotion, to convince him of his fortitude, he no longer dared to make head against so brave a people. He made a peace with the Romans, and never after supported the claims of Tarquin. The story of Porsenna's attack upon Rome forms the subject of one of Macaulay's stirring "Lays of Ancient Rome."

Porson, Richard, an English critic; born in East Ruston, England, Dec. 25, 1759. In 1777 he entered Trinity College, Cambridge, where he highly distinguished himself in classics, and in 1782 took the degree of B. A. and was chosen to a fellow-

Port

ship. This he resigned in 1792, since it could no longer be held by a layman, and Porson declined to take holy orders. Soon after he was unanimously elected Greek professor, a post which, however, brought him an income of only \$200 a year. He edited and annotated several Greek works, especially four of the dramas of Euripides, and enjoyed the reputation of being one of the best Greek scholars and critics of the age, notwithstanding which he experienced little patronage, a circumstance partly attributable to his intemperate habits. In 1805 he was appointed librarian to the London Institution. He was familiar with English literature, and wrote for some of the chief periodicals of the day. He died in London, Sept. 25, 1808.

Port, a harbor, natural or artificial; a haven; a sheltered inlet, cove, bay, or recess, into which vessels can enter, and in which they can lie in safety from storms. In law, a place appointed for the passage of travelers and merchandise into or out of the kingdom; a place frequented by vessels for the purpose of loading or discharging cargo, and provided with the apparatus necessary to enable them to do so.

Port, a species of red wine, produced chiefly in the mountainous districts of Portugal, and shipped from Oporto. After the juice has been pressed from the grape, and fermentation fairly started, a certain quantity of spirit is added to impede the process, so as to retain in the liquid some of the saccharine matter, as well as the flavor of the grape. A good port wine should possess body and aroma, a full and rich color, moderate fruitiness, and be neither too sweet nor too rough. The proportion of proof spirit varies from 26 to 36 per cent. It is frequently adulterated, both before it reaches the United States and after its arrival here, sometimes by the addition of inferior wines or elderberry juice, at other times by diluting with water, adding a cheap spirit, and restoring the color by means of logwood or some other dye. A little powdered catechu is also occasionally added to produce a rough and astringent flavor and to insure a fine crust.

Port, a framed opening in a ship's side through which a gun is fired, a hawser passed out, or cargo passed in or out. They are known by various names, as cargo port, gun port, etc.

Portal Circulation, a subordinate circulation of blood from the stomach and intestines through the liver.

Portalis, Jean Etienne Marie, a French jurist; born in Provence, April 1, 1745; practised law in Paris, was imprisoned and prosecuted during the Revolution, but under Napoleon was the chief author

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of the famous "Civil Code." He died in Paris, Aug. 25, 1807.

Portal Vein, a vein about three inches long, commencing at the junction of the splenic and superior mesenteric veins and passing upward a little to the right to reach the transverse fissure of the liver.

Port Arthur, the terminus of the E. division of the Canadian Pacific Railway, on Thunder Bay, an arm of Lake Superior, 993 miles W. N. W. of Montreal.

Port Arthur, Lushwankau, or Lushunku, a former naval station of China, with a fine narrow-mouthed harbor at the end and on the E. side of the peninsula jutting S. W. from Manchuria, opposite Chifu, strongly fortified; formerly the headquarters of the N. fleet of China. It was taken by the Japanese in 1894, and was restored to China by coercion of European powers. On Dec. 19, 1897, a Russian fleet occupied it with China's consent; on Jan. 28, 1898, it was ceded to Russia; and on Jan. 1, 1905, it was captured by the Japanese after a remarkable siege.

Port Arthur Ship Canal, an artificial waterway in Texas. The small town of Port Arthur is situated on Sabine Lake, a body of water 3 miles long and 10 miles wide, which marks the boundary of Texas and Louisiana. Seven and one-half miles from Port Arthur Sabine Lake narrows into a long channel called Sabine Pass. This channel is from 26 to 40 feet deep and extends for 7 miles to the S., terminating in the Gulf of Mexico. At the outer end of the pass is a bar which has been pierced by a channel formed by extending for a mile or more from shore two jetties of piled stone, built by the United States government, and which when completed will cost \$1,050,000. The jetties narrow the entrance to the pass from the gulf, and the wash of the imprisoned waters to and fro, with the ebb and flow of the tide, has secured a channel over the bar of 16 to 25 feet deep. The opening of this canal signaled the creation of a new seaport on the gulf for the largest ocean vessels, the connection of a land-locked fresh-water harbor with the terminus of an 800-mile N. and S. railway system, and the reduction by 500 miles of the distance over which the export food products of the S. W. States have been hauled by E. and W. lines. The canal was formally opened March 25, 1899, in presence of about 5,000 people, with appropriate ceremonies.

Port-au-Prince, the capital of Haiti, situated on the W. coast, at the head of a bay of the same name. Pop. about 70,000.

Port Breton, a name given to the S. E. part of New Ireland (now German), the scene in 1879 of a disastrous experiment in colonizing by a company of French Legi-

timists. The Marquis Du Rays, who floated the company, and his associates were condemned to various terms of imprisonment (1883) for fraud and raising money on false pretenses.

Portcullis, a strong defensive framework of timber, hung in grooves within the chief gateway of a fortress, or a castle, or an edifice of safety; it resembled the harrow, but was placed vertically, having a row of iron spikes at the bottom, and was let down to stop the passage in case of assault. There were frequently two or more portcullises in the same gateway.

Portcullis Money, a name given to money coined in the end of the reign of Queen Elizabeth for the use of the East India Company in their trading in the East. It was so called from the portcullis crowned borne on the reverse, the queen's effigy being on the obverse. The portcullis crown, or piece of eight testers, was equal to a Spanish dollar or piece of eight, or one dollar of American money.

Port Darwin, one of the finest harbors in Australia; situated on the N. coast of South Australia. Its entrance is 2 miles wide, and vessels of any tonnage can float in it with safety. Palmerston, the chief town on its shores, is the land terminus of the overland telegraph, 1,973 miles from Adelaide, and of the cable to Java, and the starting point of a railway (1891) to the gold fields of the interior, 150 miles distant.

Port Draco. See PIRÆUS.

Porte, Ottoman, or Sublime Porte, the common term for the Turkish government. The chief office of the Ottoman empire is styled Babi Ali, literally, the High Gate, from the gate (*bab*) of the palace at which justice was administered; and the French translation of this term being Sublime Porte, hence the use of this word.

Porte Crayon. See STROTHER, DAVID HUNTER.

Port Elizabeth, a seaport of Cape Colony Province, South African Union; on the W. shore of Algoa Bay, 85 miles S. W. of Graham's Town and 350 S. of Kimberley. It is the principal seaport of the E. part of the province, and also of Orange Free State Province. Its public buildings, solid and substantial edifices, are the town house, the provincial hospital, churches, the Grey Institute, a college, a library (20,000 volumes), a museum, etc. There are two parks and several tree-planted squares. The town was founded in 1820. Two piers were constructed to protect the harbor in 1881; and an aqueduct, 28 miles long, has brought good water to the town since 1878. Pop. (1904) 32,959.

Porter, a carrier; one who carries burdens, parcels, luggage, etc., for hire. A

dark colored malt liquor, so called from having been originally the favorite drink of London porters. In forging (1) A long bar of iron attached in continuation of the axis of a heavy forging, whereby it is guided beneath the hammer or into the furnace, being suspended by chains from a crane above. A cross lever fixed to the porter is the means of rotating the forging beneath the hammer. (2) A smaller bar from whose end an article is forged, as a knife blade, for instance.

Porter, Anna Maria, an English novelist; born in Durham, England, in 1780; sister of Jane and Sir R. K.; she wrote "Artless Tales" (1793-1795), which was succeeded by a long series of novels, among them: "Walsh Colville" (1797); "The Lakes of Killarney" (1804); "The Hungarian Brothers" (1807); "The Recluse of Norway" (1814); "The Knight of St. John" (1817); "The Fast of St. Magdalen" (1818); "Roche Blanche" (1822); "Honor O'Hara" (1826); "Barony" (1830); also "Ballads, Romances, and Other Poems" (1811). She died in 1832.

Porter, David, an American naval officer; born in Boston, Mass., Feb. 1, 1780, the son of a naval officer who fought through the Revolutionary War. He was appointed midshipman in 1798, and lieutenant the year after; saw service against privateers in the West Indies, and against Tripoli in 1801-1803; became captain in 1812, and captured the first British warship taken in the war. In 1813, with the "Essex" (32 guns), he nearly destroyed the English whale fishery in the Pacific, and took possession of the Marquesas Islands; but in March, 1814, his frigate was destroyed by the British in Valparaiso Harbor, and Porter returned home on parole. He afterward commanded an expedition against pirates in the West Indian waters, and was court-martialed for compelling the authorities at Porto Rico to apologize for imprisoning one of his officers. Porter resigned in 1826, and was for a time at the head of the Mexican navy. In 1829 the United States appointed him consul-general to the Barbary States, and then minister at Constantinople, where he died, March 3, 1843.

Porter, David Dixon, an American naval officer; born in Chester, Pa., June 8, 1813; son of Commodore David Porter. He entered the navy as midshipman in 1829; served under Commodores Biddle and Pattison; passed his examination in 1835; was employed in 1836 to 1841 in the survey of the coast of the United States; in 1841 appointed as lieutenant to the frigate "Congress," and employed four years on the Mediterranean and Brazil stations; in 1845 was transferred to the National Observa-

tory at Washington, and during the Mexican War to the naval rendezvous at New Orleans; again to the coast survey, and from 1849 to 1853 engaged in command of the California mail steamers. At the commencement of the Civil War he was appointed with the rank of commander, to the steam sloop-of-war "Powhatan"; distinguishing himself in the capture of New Orleans, and commanded the gunboat and mortar flotilla which coöperated with the squadron of Admiral Farragut in the first attack on Vicksburg. In the fall 1862 he was placed in command of all the naval forces on the W. rivers above New Orleans, with the rank of rear-admiral, when his ability as a commander was demonstrated in many ways. At the termination of the war appointed superintendent of the United States Naval Academy, Annapolis. He was made vice-admiral in 1866, and in 1870 became admiral. He died in Washington, D. C., Feb. 13, 1891.

Porter, Fitz-John, an American military officer; born in Portsmouth, N. H., June 13, 1822; was graduated at the United States Military Academy in 1845; served in the Mexican War, and made brevet captain and major for gallantry at Molino del Rey and Chapultepec. In 1861 was appointed colonel of the 15th U. S. Infantry, displaying great gallantry at Cold Harbor, Malvern Hill, Antietam, and Mechanicsville. For an alleged disobedience at the second battle of Bull Run, Aug. 29, 1862, Porter was court-martialed, and on Jan. 21, 1863, was cashiered. In 1878 a trial was granted, and the court recommended that the former sentence be reversed, and that he be restored to his former rank in the army, but no decisive action was taken. In 1882 President Arthur remitted so much of the penalty as prohibited him from holding office. New evidence came to light, General Grant affirming that Porter had been unjustly treated, and a bill was introduced in Congress providing for his reinstatement. In 1886 the bill passed both Houses, and became a law by the signature of the President. He died in New York city May 21, 1901.

Porter, Horace, an American diplomatist; born in Huntingdon, Pa., April 15, 1837, son of David R. Porter, who became governor of the State. His early schooling was in the Harrisburg academy. After a year in the scientific department of Harvard University he entered the United States Military Academy. His graduation took place in 1860. After a brief space as instructor in artillery at West Point, he was assigned to duty in the Department of the East. After being sent to Washington as a bearer of dispatches he was promoted to be 1st lieutenant while under Sherman

and Dupont in the expedition against Port Royal. In 1863 he was brevetted captain for gallant services at the capture of Fort Pulaski, where he had command of the siege batteries. In May, 1864, he was brevetted major for his conduct in the battle of the Wilderness. The next year found him brevet lieutenant-colonel, and 1865 brevet Brigadier-General of the United States army. He had been chief of ordnance of the army of the Potomac under General McClellan, but after the battle of Antietam was transferred first to the army of the Ohio and then to the army of the Cumberland. While on the staff of General Thomas at Chattanooga he became acquainted with General Grant. Their intimacy lasted till Grant's death. General Porter became an aide-de-camp on Grant's staff, and was with him during most of the rest of the war. He was one of the few persons who witnessed the surrender of Appomatox.

When General Grant became Secretary of War General Porter became the assistant secretary, and during his chief's service as President acted as private secretary. General Porter then went into business and was exceedingly successful. He was connected with numerous important corporations; among them many of the largest railroad companies of the West. He belonged to most of the prominent clubs in the country and was president of the General National Society of the Sons of the American Revolution and the Grant Monument Association. The completion of the Grant monument is largely the result of his efforts. The project languished when a start had been made on it till General Porter made a personal canvass through which \$400,000 was raised in two months. In 1897-1905 he was ambassador to France, where he recovered the remains of JOHN PAUL JONES (*q. v.*).

Porter, James Davis, an American politician; born in Paris, Tenn., Dec. 7, 1828; was graduated at the University of Nashville in 1846; admitted to the bar in 1850; member of the Tennessee Legislature in 1859-1861; judge of the 12th Judicial Circuit in 1870-1874; governor of Tennessee in 1874-1878; United States assistant-secretary of State in 1885-1889; and United States minister to Chile in 1893-1897. He wrote "The Confederate Military History of Tennessee."

Porter, Jane, an English author; born in Durham, England, in 1776, daughter of an army-surgeon who died soon after her birth. She was brought up at Edinburgh and in London, and made a great reputation in 1803 by her high flown romance, "Thaddeus of Warsaw," which was distanced in its kind in 1810 by "The Scottish Chiefs." The hero of the latter is a

stilted and preposterous figure enough — as little of the historical Wallace as could well be, yet the book retains its interest for youthful readers, and had the merit of prompting Scott to complete "Waverley." Other books were "The Pastor's Fireside" (1815); "Duke Christian of Lüneburg" (1824); "Tales Round a Winter's Hearth" (in collaboration with her sister Anna Maria, 1824), "The Field of Forty Footsteps" (1828), and "Sir Edward Seaward's Narrative of his Shipwreck and Consequent Discovery of Certain Islands in the Caribbean Sea" (1831), a clever fiction, edited by her, but almost certainly written by her eldest brother, Dr. William Ogilvie Porter. With this brother she spent some years at Bristol, and died there May 24, 1850.

Porter, John Addison, an American journalist; born in New Haven, Conn., April 17, 1856. He was editor of the Hartford "Post." His works are: "The Corporation of Yale College" (1885); "Administration of the City of Washington" (1885); "Sketches of Yale Life" (1886). President McKinley appointed him "secretary to the President"—an office that was created from him, to replace the misnamed post of the "private secretary" at the White House. He died in Putnam, Conn., Dec. 15, 1900.

Porter, Noah, an American educator; born in Farmington, Conn., Dec. 14, 1811. In 1846 he was appointed Professor of Metaphysics at Yale University; and was president of that institution from 1871 to 1885. The most valuable of his numerous works are: "Human Intellect" (1868); "Books and Reading" (1870); "American Colleges and the American Public" (1870); "Moral Science" (1885). He died in New Haven, Conn., March 4, 1892.

Porter, Sir Robert Ker, an English artist; born in Durham, England, about 1775; was brother to Jane and Anna Maria Porter, became a student at the Royal Academy, painted several large battle pieces, and in 1804 was invited to Russia by the emperor, who made him his historical painter. In 1808 he joined the British forces under Sir John Moore, whom he accompanied to Spain. Subsequently he returned to Russia and married the Princess Sherbatoff. In 1813 he obtained the honor of knighthood. From 1817 to 1820 inclusive he was engaged in traveling through the East, and from 1826 to 1841 was British consul to Venezuela. Among his works are "Traveling Sketches in Russia and Sweden"; "Letters from Portugal and Spain"; "Narrative of the Campaign in Russia"; "Travels in Georgia, Persia, and Armenia." He died in St. Petersburg, Russia, May 4, 1842.

Porter, Robert P., an American statistician; born in Norfolk, England, Jan. 30, 1852; settled in the United States in 1867, and soon afterward engaged in journalism. He reported on wealth, debt, taxation and transportation in the United States for the 10th census; was appointed a member of the Tariff Commission in 1882; was for a while superintendent of the 11th census; and was a special United States commissioner to Cuba and Porto Rico in 1898-1899. He was a founder of the New York "Press."

Porter, Rufus, an American inventor; born in West Roxford, Mass., May 1, 1792; devised a thermo-engine, rotary-engine, cornsheller, rotary plow, etc., and founded "The Scientific American." He died in New Haven, Conn., Aug. 13, 1884.

Porter, The, a twin-screw, steel torpedo boat of the United States navy; 180 tons displacement; length 175 feet, 9 inches; breadth, 17 feet; mean draft, 5 feet, 6 inches; armament, four 1-pounder, rapid-fire guns and three 18-inch Whitehead torpedo tubes; speed, 27.5 knots an hour; crew, 4 officers and 16 men; cost \$147,000.

Port Essington, an inlet in the Coburg Peninsula on the N. coast of Australia, forming a fine harbor. On its shores there was from 1831 to 1850 a penal settlement.

Port Famine, the name given by Cavendish in 1587 to a spot in Patagonia on the N. coast of the Straits of Magellan. From 1843 to 1853 it was a Chilean penal colony.

Port Glasgow, a town of Renfrewshire, Scotland; on the S. shore of the Firth of Clyde, 3 miles E. S. E. of Greenock and 20 W. N. W. of Glasgow. It was founded in 1668 by the magistrates of Glasgow as a harbor for their city, the deepening of the Clyde not having yet been thought of. In 1710 it was constituted the head custom house on the Clyde, and for a while took the lead of Greenock. Built on low alluvial ground, and backed by hills 700 feet high, it has a Doric town house (1815), a public hall (1873), ruined Newark Castle (1597), a wet dock of 12 acres (formed since 1834), a large graving dock (1874), extensive timber ponds, ship building yards, iron and brass foundries, etc.

Port Hamilton, a spacious, well sheltered Chinese harbor, formed by three islands of the Nan-how group, 30 miles S. of Korea and 45 N. E. of Quelpart. It was annexed by Great Britain as a prospective coaling station in 1885, but abandoned in the following year. It was discovered and named by Belcher in 1845.

Port Hudson, a village of East Baton Rouge parish, La.; 25 miles N. by W. of Baton Rouge. In May, 1863, this place, strongly covered by advanced works, and defended by the Confederate Gen. Frank K.

Port Huron

Gardner, was invested by General Banks. Three assaults made on May 27, June 11 and 14, having been vigorously repulsed, with a loss of about 3,000 men on the National side, General Banks resolved to continue the siege in the ordinary way, without further attempt at storming the place. On July 7, General Gardner learning the surrender of Vicksburg, entered into a capitulation. General Banks entered the town two days after, taking possession of two steamers, 51 pieces of artillery, and a quantity of small arms. The garrison of 6,408 men became prisoners of war.

Port Huron, a city and county-seat of St. Clair co., Mich.; on the St. Clair and Black rivers, at the foot of Lake Huron and on the Flint and Pere Marquette, the Chicago and Grand Trunk, and the Grand Trunk railroads; 60 miles N. E. of Detroit. Here are a United States Government Building, electric light and street railroad plants, waterworks, public library, public hospital, National and State banks, and daily and weekly periodicals. The city has a large trade with Canada. Its industrial plants include the shops of the Grand Trunk railroad, fiber, corset, and smelting works, saw mills, flour mills, dry docks and boiler works. The assessed property valuation is nearly \$47,000,000. Pop. (1900) 19,158; (1910) 18,863.

Portici, a town of Italy; on the slope of Vesuvius, 5 miles S. E. of Naples. Its environs are delightful, and are dotted over with country houses. The royal palace built (1738) by Charles III. is now an agricultural college. There are a small fort, fishing, and sea bathing. Silkworms are reared and ribbons made.

Portico, a covered walk, supported by columns, and usually vaulted; a piazza or arched walk; a porch before the entrance of a building fronted with columns. Porticoes are known as tetrastyle, hexastyle, octostyle, or decastyle, according as they have four, six, eight, or 10 columns in front. A prostyle portico is one projecting in front of the building; a *portico in antis* is one receding within the building.

Port Jackson, a beautiful and extensive inlet on the E. coast of Australia in New South Wales, forming a well sheltered harbor on the S. shore of which Sydney stands. See SYDNEY.

Port Jervis, a town in Orange, co., N. Y.; at the confluence of the Neversink and Delaware rivers, at the intersection of the boundary lines of New York, New Jersey, and Pennsylvania, and on the Erie, and the Port Jervis, Monticello, and New York railroads, 88 miles N. W. of New York. Here are the quarters of the Neversink Valley Historical Society, St. Mary's Orphan Asylum, street railroad and electric

Portland

light plants, waterworks, a Soldiers' Monument at the intersection of the State boundary lines, National banks, and several daily and weekly newspapers. The town has iron foundries, railroad repair shops, boot and shoe factories, etc., and an assessed property valuation of nearly \$2,000,000. Pop. (1900) 9,385; (1910) 9,564.

Portland, a city, port of entry, and county-seat of Cumberland co., Me.; on Casco Bay, and on the Boston and Maine, the Grand Trunk, the Portland and Rochester, the Maine Central, and other railroads; 105 miles N. E. Boston. It has direct steamboat connections with Boston and New York, and two weekly steamship lines to Europe. The city is delightfully laid out along a peninsula, in the harbor, protected by a massive breakwater. Here are a custom house, postoffice, United States Marine Hospital, the Maine General Hospital, headquarters of the Maine Historical Society, Portland Society of Natural History, the Wadsworth mansion, the Longfellow homestead, etc. The city has waterworks, several libraries, electric light and street railroad plants, National, State, and savings banks, Portland School for the Deaf, Old Men's Home, Old Ladies' Home, St. Elizabeth's Academy, etc. Portland has about 700 manufacturing establishments, with an annual output valued at over \$12,000,000. The industries, include boot and shoe factories, sugar refineries, rolling-mills, foundries, machine shops, locomotive works, engine and boiler works, petroleum refineries, match factories, chemical works, tanneries, paint and oil works, carriage and sleigh factories, manufactures of stoneware, jewelry, edge tools, varnishes, soap and lamps, meat packing establishments, coopering establishments, lumber mills, etc. Shipbuilding is still carried on, though of less importance, relatively, than in former years. Fishing and the shell-fish industry are extensively pursued. The assessed property valuations exceed \$45,000,000, and the total debt is about \$3,000,000. Portland was settled by the English in 1632; was burned by the Indians in 1676; and by the French and Indians in 1690; was rebuilt in 1715; burned by the English in 1775; and rebuilt in 1783. It received its city charter in 1832. Pop. (1890) 36,425; (1900) 50,145; (1910) 58,571.

Portland, a city, port of entry, and county-seat of Multnomah co., Or.; on the Willamette river, and on the Northern Pacific and Southern Pacific railroads; 12 miles above the Columbia river, 120 miles from the ocean, and 530 miles N. of San Francisco, Cal. The city is built on sloping ground; is surrounded by beautiful scenery; and has a most enjoyable climate, being much warmer in winter than many Southern cities.

Portland

Business Interests.—The Willamette river is navigable for large vessels, and a considerable trade is carried on with Great Britain, Japan, China, Hawaii, and the South American republics. The annual value of exports which include wheat, flour, wool, fish, timber, etc., is over \$20,000,000. There are more than 600 manufacturing establishments, with an output valued at more than \$30,000,000 per annum. The principal manufactures are pig iron, woolen goods, flour, furniture, beer, cordage, carriages, clothing, boots and shoes, engine boilers, etc. There are about 20 National, State, and private banks, and many daily, weekly, and monthly periodicals. The assessed property valuations exceed \$28,000,000, and the total bonded debt is over \$5,000,000.

Public Interests.—The city has an area of 40 square miles; 650 miles of streets; a system of waterworks, owned by the city, that cost nearly \$4,000,000, with 155 miles of mains; and a sewer system covering 90 miles. The streets are lighted by electricity at a cost of about \$53,000 per annum. The police department costs annually about \$63,000, and the fire department, about \$90,000. There is a public school enrollment of over 12,000 pupils, and an annual expenditure for public education of nearly \$250,000. The annual cost of maintaining the city government is over \$960,000. Portland contains the Medical and Law Schools of the State University, Portland University, Portland Academy, St. Helen's School for Girls, Bishop Scott School, Library Association, Good Samaritan, St. Vincent, and Portland Hospitals, etc.

History.—Portland was settled in 1845 and received its city charter in 1851. It annexed the cities of East Portland and Albina in 1891. The city has had a marvellous growth and in proportion to its population has been said to be the wealthiest city in the United States. Pop. (1890) 46,385; (1900) 90,426; (1910) 207,214.

Portland, Isle of, a peninsula, supposed to have been formerly an island, in the county of Dorset, 50 miles W. S. W. of Southampton, in the British Channel. It is attached to the mainland by a long ridge of shingle, called the Chesil Bank, and it consists chiefly of the well-known Portland stone, which is chiefly worked by convicts, and is exported in large quantities. One of the most prominent objects in the island is the convict prison, situated on the top of a hill. It contains about 1,500 convicts. The S. extremity of the island is called the Bill of Portland, and between it and a bank called the Shambles is a dangerous current called the Race of Portland. See also PORTLAND BREAKWATER.

Portland Stone

Portland Beds, in geology, a series of marine beds, 180 feet thick, of Upper Oölitic age, found chiefly in PORTLAND (*q. v.*), but also in Oxfordshire, Buckinghamshire, and Yorkshire. They constitute the foundation on which the fresh-water limestone of the Lower Purbeck reposes. Etheridge divides them into 14 distinct well-defined beds; the first nine constitute the Portland stone, the remaining five the Portland sand or Marly series. The Portland stone is again subdivided into the building beds, viz., the first two, and the flinty beds, the third to the ninth. About 50 species of Mollusca occur, some of them great ammonities. Of reptiles are, Stenosaurus, Gonio-pholis, and Cetiosaurus.

Portland Breakwater, the greatest work of the kind in Great Britain, runs from the N. E. shoulder of the ISLE OF PORTLAND (*q. v.*) in a N. E. direction, with a bend toward the English Channel, and forms a complete protection to a large expanse of water between it and Weymouth, thus forming an important harbor of refuge. It consists of a sea wall 100 feet high from the bottom of the sea, 300 feet thick at the base, and narrowing to the summit, and has a length of $1\frac{5}{8}$ miles, consisting of two portions, one connected with the shore, 1,900 feet in length, and another of 6,200 feet in length, separated from the former by an opening 400 feet wide, through which ships can pass straight to sea with a N. wind. It is protected by two circular forts, the principal at the N. end of the longer portion. The work, which was carried out by government, occupied a period of nearly 25 years, ending with 1872, and cost \$5,168,000, exclusive of convict labor. It is constructed of Portland stone.

Portland Cement, a cement having the color of Portland stone. It is prepared by strongly heating an artificial mixture of clay and carbonate of lime, or sometimes natural lime, stones and chalky clays, such as the argillaceous mud of the Thames and chalk, and afterward grinding it to a fine powder. It hardens to great resistance under a water mixture. The production of Portland cement in the United States during the calendar year 1908 was 51,072,612 barrels, valued at \$43,547,679; and in the period of 1870-1908 the production was 395,567,395 barrels. In the latter year the leading producing States were Pennsylvania, Indiana, Kansas, Illinois, New Jersey, Michigan, Missouri, and New York.

Portland Stone, a freestone quarried in the Isle of Portland, Great Britain, hardening by exposure to the air, and much used for building purposes in London. It

Portland Vase

was largely employed in the erection of St. Paul's Cathedral, Somerset House, etc.

Portland Vase, a cinerary urn or vase, found in the tomb of the Emperor Alexander Severus, and long in possession of the Barberini family. In 1779 it was purchased by Sir W. Hamilton, and afterward came into the possession of the Duchess of Portland. In 1810 the Duke of Portland, its owner, and one of the trustees of the British Museum, allowed it to be placed there for exhibition, where it now is publicly to be seen. In 1845 it was maliciously broken to pieces; it has since been repaired. It is 10 inches high and six in diameter at the broadest part, of transparent dark-blue glass coated with opaque white glass, cut in cameo on each side into groups of figures in relief, representing the marriage of Peleus and Thetis.

Port Louis, the capital and principal port of the British colony of Mauritius; on an excellent harbor on the N. W. coast, and enclosed by a ring of lofty hills. It is defended by forts (1887-1891), is a coaling station of the British navy, and has barracks and military storehouses. There are three graving docks besides the harbor, through which all the commerce of Mauritius passes. The drainage has been greatly improved of late. The city contains the government house, a Protestant and a Roman Catholic cathedral, a royal college, etc. Pop. (1901) 52,740.

Port Mahon, the capital of the island of Minorca; beautifully situated on a deep, narrow inlet in the S. E. of the island. Its harbor is one of the finest in the Mediterranean, and is protected by powerful forts and fortifications. Building stone, shoes, cottons, cattle, and honey are exported. The town was held by the English from 1708 to 1756, and again from 1762 to 1782. It was they who made it a first-class fortress.

Porto Alegre, capital of the Brazilian State of Rio Grande do Sul, stands at the N. W. extremity of the Lagoa dos Patos, by means of which it communicates with the sea. It was founded in 1742. It contains a cathedral, an arsenal, military and normal schools, an episcopal seminary, and a German club. Most of the wholesale trade is in the hands of the Germans, who number some 3,000. Railways bring the produce of the interior down to the port, which, however, can only be entered by ships drawing 8½ feet. There are manufactures of pianos, furniture, brandy, and beer. Pop. (1906) 80,000.

Portobello, a Scotch watering place on the S. shore of the Firth of Forth, 3 miles E. of Edinburgh. Its first house (1742) was built by one of Admiral Vernon's seamen in the expedition against Puerto Bello,

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and hence it derived its name; but it dates, like its E. extension Joppa, almost wholly from a time later than 1804. An esplanade, ¾ mile long, skirts the broad level sands; and there are a promenade pier of 1,250 feet (1871), municipal buildings (1878), half-a-dozen churches, and manufactures of pottery, bricks, bottles, etc. Portobello, with Leith and Musselburgh, returns one member to Parliament.

Portobelo, a small seaport town of Colombia, on the N. shore of the Isthmus of Panamá, almost due N. of the town of Panamá. It has an excellent harbor, discovered by Columbus in 1502, but is very unhealthy, and has fallen into decay since 1739, when it was stormed by Admiral Vernon, during the war between England and Spain.

Porto di Fermo. See FERMO.

Porto Maurizio, a town of N. Italy, stands embowered in olive groves on the Gulf of Genoa, 60 miles S. W. of Genoa and 41 E. by N. of Nice; consists of an old town on the hills and a new town next the sea, with a small harbor.

Porto Novo, a small port on the Coromandel coast of India, 145 miles S. of Madras. Both the Danes and the Dutch had formerly a factory here. The place is celebrated for the battle fought here on July 1, 1781, when Sir Eyre Coote, with 8,000 men, defeated Hyder Ali and an army of 60,000. From 1824 on for some years there was an iron foundry here, the ore being brought from Salem.

Port Orchard, a United States naval station in Kitsap co., Wash.; on Port Orchard Bay, an inlet of Puget Sound, 18 miles W. of Seattle; formerly known as Sidney; name changed as at present in 1894. In 1891 the government purchased 200 acres of land and expended \$700,000 in building a dry dock 600 feet long by 75 feet wide and capable of holding vessels with a draught of 30 feet, being thus the largest dry dock in the United States, if not in the world.

Porto Rico, a West Indian island; 70 miles E. of Haiti; till 1898 a colony of Spain; area, 3,600 square miles; pop. (1910) 1,118,012; capital, San Juan; metropolis, Ponce. Under the provisions of the American-Spanish peace protocol the American flag was officially raised and the island formally transferred to the United States on Oct. 18, 1898. The Spanish form of the name of the island is Puerto Rico; but an Act of the United States Congress approved April 12, 1900, established the official form as Porto Rico.

The United States Insular Commission, under date of June 9, 1899, gave the fol-

lowing outline of the conditions and interests of the island:

The People.—The people of Porto Rico are most loyal in their devotion to their new country and are solicitous to be regarded as a part of the United States. On every hand we heard of all classes and conditions ready and willing to accept American institutions and to be content with them, and at the same time they are asking that the spirit of our laws and institutions be given them and that they be quickly relieved of the oppressive laws to which they have so long been subjected by Spanish rule.

There is much wealth and great intelligence among the more favored classes, and there is most unbounded hospitality on every hand. The doors of the Porto Rican houses are wide open to the country's guests, and the extent of their hospitality is unmeasured as it is cordial. While there is a great amount of wealth in the island, and in many places evidences of great prosperity, rich plantations, and promise of a great future for Porto Rico, there is also great poverty and ignorance. Throughout the interior of the island the people are poor and their homes are of the poorest possible character, consisting almost altogether of "shacks" constructed of the palm and covered with a straw thatch or palm leaves. Into the cities and these homes is crowded a large population, variously estimated from 800,000 to 1,000,000 souls. The people are very industrious and willing to work if given an opportunity, and in every instance those employing them speak in terms of commendation of them as workmen.

They are generally a peaceful and law-abiding people, and while there is unquestionably some lawlessness, and some small offenses are being committed, they do not exceed, if they equal, the number being committed in the States of a like population. There is no question but that there is great ignorance throughout the entire island. Of a population of 800,000, it has been variously estimated that from 10 to 20 per cent. only of the people can read and write. Compulsory education was unknown, and parents who had not themselves received any education did not require their children to attend the schools, if any existed within reach, and the condition of the schools was not such as was calculated to encourage attendance, and thus the ignorance extended and broadened till it covered the entire island. The people are now anxious to have their children educated, and are exceedingly solicitous for the establishment of public schools.

There is no starvation upon the island, and while there is very great poverty in

many places, we do not believe there can be any real starvation in Porto Rico, for the simple reason that the people live so frugally and are content with so little, while the soil and the climate are so productive of many of the simple necessities of life that it would be almost impossible to starve a people who live upon tropical fruits and tropical vegetable productions.

Present Government.—The present civil government of the island is entirely within the military control of the governor-general, and subject solely to his orders and decrees. The old system which prevailed under the Spanish régime, and of which this is a substantial continuance, was the creation of innumerable offices, which were intended to be distributed as rewards for the followers and as safeguards for the defense and protection of the government which was holding the island and the people of Porto Rico under subjection and control. This system extended not alone to the government of the island itself, but to the municipalities as well; and throughout the entire island there are a horde of office-holders, nearly all of whom are simply sinecures, and whose salaries in nearly every instance consume a very large part of the taxes imposed upon and collected from the people. Many of the offices were regarded as personal property, to be transmitted or assigned for a consideration.

The taxes collected for the support and maintenance of public works, public schools, and public improvements were largely diverted from their proper channels and used simply to pay the salaries of the office-holders, who were returning little or nothing for the exorbitant amounts received. The general government itself was regarded simply as a place to which the more favored following of the party in power should be assigned, with a view of reaping a rich harvest and gathering quick and profitable returns. The continuance of the present civil government, which is substantially that under which the island was formerly governed by Spain, and which has been largely experimental by the present government, has proven absolutely that radical changes are necessary to give the Porto Ricans opportunity for advancement under our systems and laws.

Finance.—The currency of the country consists of Porto Rican silver, together with about \$1,100,000 of the paper currency of the Spanish Bank of San Juan. The entire amount of Porto Rican silver in circulation is about \$5,500,000. In addition to this there is now upon the island perhaps an equal amount of American money, both paper and silver, which has been put in circulation through the payments made to the United States soldiers,

through the custom house, and by the tourists, sightseers, and investors who have been visiting the island. The Spanish Bank has accumulated and holds within its vaults about \$1,100,000 in Porto Rican silver, gathered together for the purpose of redeeming its outstanding paper currency, which it is now prepared to do, and is doing as rapidly as possible. This will in effect shorten the present circulation of Porto Rican money in amount equal to the contraction of the currency of the Spanish Bank, but will leave in circulation substantially \$5,500,000 of Porto Rican silver. While there is some gold in circulation, it is rarely if ever seen on the island, and none is in general circulation.

The currency of the country, instead of having been contracted during the brief occupancy of the United States, has been largely increased, and is now almost double what it was one year ago. This has, in great measure, stimulated many kinds of business, which were for a time greatly depressed, and merchants and traders are beginning to experience the benefits of this increase. As yet it is not likely that the effects of the increase have been felt to any great extent by the farming and producing classes, but is mainly confined to the centers of trade and commerce. By direction of the President, on Jan. 20, 1899, a Porto Rican peso, or dollar, is to be received for 60 cents. This valuation placed upon the Porto Rican money makes the silver of the United States equal to 166 2-3 cents as compared to the Porto Rican peso, and at this rate it is now supposed to be circulating in Porto Rico. In fact, however, the merchants, traders, bankers, and business people receive the same at a valuation of 164 or 165, thus making quite a shade of difference in the value of the two currencies when transactions are in any large amounts, and leaving quite a margin for speculation and profit in exchange.

It can readily be seen how profitable it would be to coin this silver at the present value of the ore, which does not exceed 40 to 50 cents, and unload it in Porto Rico at 60 cents on the peso. And it will also appear how necessary it is that the government of the United States, which must ultimately care for this currency, should have absolute control of its coinage and output. The business of the country is now conducted on a double basis, or two standards of value, one based on the American dollar of 100 cents valuation, and the other on the Porto Rican peso at 60 cents. This double standard of value seriously disturbs and makes confusion in all kinds of trade and traffic, and results in frequent extortionate demands from misunderstandings in trade and business, and it is hardly neces-

sary to say that it should be remedied as speedily as possible. While it is true that the two standards exist and are recognized, and attempts are made to enforce them, in many instances which came within our notice the prices which had been originally asked in Porto Rican currency were at later periods demanded for the same articles in American currency, thus making an increase of 66 2-3 per cent. in the prices of such articles, and this received additional impetus from the provision of General Henry, directing that official salaries formerly paid in Porto Rican money be thereafter paid in gold. This gave an advantage to the sharp and cunning dealer and was decidedly disadvantageous to the honest and fair-minded one.

In our judgment, the present Porto Rican currency should be retired and the United States currency be supplied to take its place. This can be done through the custom houses or through the banks. If our estimate of the amount of Porto Rican silver now in circulation is correct, there is \$5,500,000 of this money outstanding and in circulation for redemption; estimating it at its present commercial value, it would be worth \$3,300,000, at 60 cents on the peso. This amount of silver at bullion value, at the present quotation of 45 cents, would only equal \$2,475,000, thus showing a loss in the recoinage of these \$5,500,000 of \$825,000. This loss, in our judgment, should be charged to the island of Porto Rico and should be retained from its customs duties till the government of the United States is fully reimbursed for the same, and we understand that this would be satisfactory to the people of Porto Rico.

Municipal Governments.—The municipal governments of Porto Rico are still operating under the same general laws which prevailed during the Spanish régime, and their organizations are substantially the same. The same extravagant methods prevail which have for so long a time been part and parcel of Spanish occupancy and control. The number of officeholders and municipal officials are so great that large amounts of the receipts are consumed in collections and fees, and the payment of these officials. Substantially the same assessment of taxes is made in all the cities as before, with the exception of "consumption taxes" and payment of priests and those for military purposes, which are no longer collected.

Concessions and Franchises.—We believe that the building and operating of railroads in the island of Porto Rico would be one of the most important factors in developing its resources. It has been so in the United States; why not there? It gave great impetus to the growth and pro-

gress of the "Great West," and could not do less for Porto Rico. The individual or corporation that invests money in Porto Rico in the way of railroads shows much courage and great faith in the possibilities of the future. Such enterprises should be encouraged, and as few restrictions should be imposed as may be consistent with the proper safeguards for the public good. In our opinion, it will be several years before any adequate returns can be realized on investments of this kind. It is a matter of education and development, and most favorable conditions should be made to encourage the investment of capital. The building of railroads would give employment to large numbers of men. It would enable the producer to get his crop to the market at reduced cost; would enhance the values of property; build up towns and cities; elevate the people, advance their civilization, and confer so many blessings and benefits as to demand from the government the most favorable conditions and the lightest burdens.

In the United States within a few years we have donated great empires of land to aid in the building of railroads as public highways through the States and Territories, thus developing the country and bringing great benefits to the people. Porto Rico has no lands to donate, no bounties to offer, but a charter most favorable in its character should be given as an inducement to capital to make the investment. As a protection against any charge of favoritism, we would recommend that before any concessions are granted, the same, fully described, be advertised in newspapers printed in Porto Rico, also in one or more newspapers of proper circulation in the United States giving notice that said franchises will be sold on a certain date to the highest bidder, reserving the right to reject any and all bids; with the clear and definite right reserved to the government of full control over the rates of charges for passenger fare or freight rates, and of the manner of operating the road for the benefit of the people, and holding the companies accountable for damages to persons and property caused by negligent acts of the companies and of their employés.

Public Lands.—There is no reliable record of the public lands to be found in any of the offices in Porto Rico. We made diligent inquiry, and the secretary of finance promised us the best information he could procure, which, he says, is made up from answers to his inquiries of the alcaldes as to what lands are commonly regarded in their districts as public, and which are not claimed by any one. But we have not yet received the result of his inquiries, but when it comes it can be

seen from the nature of it that it will possess little value. We believe, from the best estimates we could obtain, that there are about 50,000 acres of public lands in Porto Rico. We, therefore, recommend that a full and complete survey be made of all the public or unsold lands on the island. A survey of the whole island ought to be made, sectionizing the lands so that boundaries may be definitely ascertained, after the plan of the United States, thus making short descriptions and more certain data as to boundaries. But this is too great an undertaking to be begun now, and it can well await more pressing reforms. We would further recommend that the proceeds of these lands, when sold or leased, be used for the benefit of the public schools of the island.

Temperature and Climate.—From reports since the control of the island of Porto Rico, by this government, to-wit, from November to March 1, four months, and from the Spanish records prior to that date, we glean the following summary, which may be of importance, and afford a correct basis on which to form opinions as to the climate:

	1898:	Nov.	Dec.	Jan.	Feb.
Mean temperature	77.2	75.9	74.6	75.2	
Highest	85	85	82	85	
Lowest	65	56	66	66	
Greatest daily range...	18	17	13	16	
Lowest daily range....	7	8	8	8	
Total rainfall in..	12.08	5.34	2.92	0.80	

Religion.—The religion of Porto Rico was the recognized Roman Catholic Church, and, with a single exception, no other churches existed on the island. Some years since, by a special decree, a Protestant (Episcopal) church was permitted to be erected at Ponce, which church still maintains its place and existence. The priesthood upon the island was paid by the government, and the sum of \$92,000 was annually collected in taxes and paid for this purpose. Since American occupancy the Roman clergy are now dependent on the support of the members of their own churches. Other denominations are now making efforts to establish and build churches, and representatives of many denominations are now in Porto Rico for this purpose and are meeting with encouraging success.

Courts.—The system of courts which are in operation on the island of Porto Rico are the civil law courts, or the French system of procedure.

Schools.—The schools of Porto Rico, when inspected by an American, present a state of affairs which readily explain the cause of the unfortunate condition of nine-tenths of the people of the island. That ignorance should prevail among a people when not a single building has been erected especially intended for school purposes, and not a single structure worthy of the name

exists on the island, is not to be wondered at. It is estimated that fully 9 out of every 10 persons on the island can neither read nor write, and of the children of the usual school age not one out of every 10 attends a school of any kind. The schools we visited are simply pretensions to education, and in the United States would not be regarded as being worthy of the name. The miserable hovels into which these schools are crowded, the unwholesome and unhealthy conditions surrounding them, the lack of the smallest conveniences, and the entire absence of a good system of school books is everywhere noticeable. In but a single school did we find any pretensions to desks, and in most of them the plainest and roughest benches, on which the children were compelled to sit. No attempt has been made at classification, and young and old are gathered together into one common conglomeration of filth and dirt.

Roads and Highways.—The roads and highways of Porto Rico, with few exceptions, are in the worst possible condition, where roads are known at all. These exceptions are the military road leading from San Juan to Ponce, running entirely across the island in a N. W. direction, a distance of some 80 miles; and the road leading from Cayey, on the military road, to Guayama, on the coast, a distance of some 28 miles, and the roads from Toa Alta to Bayamon, from Bayamon to Rio Piedras, and from Bayamon to Cataño, and from Ponce to Guayama, which we found fair roads. The military road, running from the capital, San Juan, to Ponce, is a stone macadam and very carefully built, with a most complete and well-constructed system of bridges and culverts. It is regarded by all who have seen it as one of the finest roads in the Western World. It is certainly a very finely built road, and while it may not probably compare with such roads in the older countries across the sea, it is of such character as to attract the attention of even those persons who have seen the best constructed roads in the United States.

This road is a most needed and indispensable means of communication across the island, and connecting, as it does, the two principal points of trade and commerce upon the island, it is impossible to estimate its value in a country where there are no direct communications by rail. The cost of this road is said to have been \$25,000 per mile. It has greatly assisted in developing the country through which it runs, and the lands along the entire route are under cultivation. It would be impossible to imagine anything more promising than the country over which this road passes. The outlook upon the valleys filled with growing cane, the mountain sides under cultivation to their very summits, rich almost beyond description, with a soil ca-

pable of producing anything which can be grown under a tropical sun. This road and the country surrounding it are fair indices of what the whole country would soon become when once opened up by roads intersecting at all points, and affording outlets for all the productions of the country.

The road leading from Cayey to Guayama and intersecting the military road at the former place is in many respects a better road than the military road itself. It has been constructed through a mountainous country, and, though some 28 miles long really only covers a distance as the bird would fly of some 8 or 10 miles. It is a most extravagantly constructed highway, and its bridges and culverts are specimens of the finest masonry, while its road-bed is such as to command the admiration of all who travel over it. It winds about through the mountain passes and ascends from the ocean through the mountains to the height of 3,000 feet. It is said to have cost the enormous sum of \$50,000 per mile. The other roads through the island which connect important cities along the coast and passing through the island on the W. are in bad condition and are greatly in need of repair. Substantially no work has been done on them for many years, and in many places they are almost impassable. With a reasonable amount of labor and repairs judiciously done they could soon be put in fair condition and serve a most useful purpose in opening up the country to an increased trade and traffic throughout the island.

Fair roads can be constructed for from \$500 to \$600 per mile, and will serve a most useful and immediate purpose in giving an outlet to the productions of this rich and valuable portion of the island. That department of the interior known as the "department of public works" is now attempting to make improvements on these roads and highways, but it is working without such a system as would seem to bring the best results for the large amounts proposed to be expended thereon. What is mostly needed in the making of these repairs are practical roadbuilders, who have had actual experience in the construction of public roads in the States, and who can act as superintendents of construction and personally direct the labor employed thereon. These roads should be held sacred for public travel and not to be obstructed by railroads or other companies with their tracks.

Public Works.—We desire to call attention to the system of public works as now conducted under the present civil government. This department is now under the department of the interior, and in its system and conduct is largely following the old Spanish method. An army of engi-

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neers and draftsmen is employed, whose only possible duty is confined to the construction of roads and highways. This system of construction contemplates a great detail of plans and designs, with most elaborate and expensive estimates and specifications, sufficient for the most intricate and expensive of possible public works, and this, too, for many highways which are only needing repair, and others which, for the time, should be constructed upon a much more economical basis of expenditure.

Lawlessness and Insurrection.—The reports of lawlessness and contemplated insurrection upon the island of Porto Rico are without foundation. While it is true that some crimes are being committed, it is equally true that they are not in greater numbers or more significant than might reasonably be expected of a people so long under subjection and oppression.

Grain, Vegetables, and Stock.—Vegetables of all kinds known to our climate grow here in abundance—tomatoes, lettuce, onions, cabbage, pumpkins, radishes, melons, pease, beans, sweet potatoes, and yams. Irish potatoes are not a success here. We found no plums, cherries, or grapes. It would seem, however, that there would be no difficulty in growing grapes to great perfection, but so far they have not been tried. Our Indian corn is raised here with some success, and while the ears are small, that is made up by the fact that two and even three crops can be grown yearly on the same ground. This can be grown either in the valleys or on the hillsides; we found it growing clear up on the sides of the mountains, 1,500 feet above the sea. No wheat is grown on the island. At present all flour is imported. It is claimed that Spain prohibited its growth on the island, but that it can be profitably cultivated here. Neither oats nor barley are cultivated here, but at least the latter might be successfully grown.

The native grasses grow luxuriantly wherever an opportunity offers, from the lowest valley to the highest mountain top, and afford excellent pasture for stock everywhere all the months of the year. They make no hay, as we understand it here, but cut it with sickles or the machete and tie it in small bundles, pack it on ponies to the cities, and sell it while it is still green. The cattle grazing in large numbers on the pastures are found all over the island, and are mostly in very good condition, making excellent beef. Hogs are raised to a limited extent, but are of poor breeds, being of the old "razor-back" variety. They are fed mainly from the nuts grown on the royal palm trees. Horses are plentiful, but are of the size known by us as ponies. They are small, and used only to ride and as pack ponies and in carriages. The hard work of hauling loads and ploughing the land is done with oxen, yoked in the Span-

Port Phillip

ish fashion by tying the yoke to the horns, and they are guided with a whip or "gad." The wagons are mostly two-wheeled carts with large wooden axles.

Mineral Resources.—There seems to be a considerable deposit of iron and copper on the island. In some places these are being developed with good prospects of proving paying investments. Traces of gold and silver are also found in the mountains, but up to date prospecting has not developed any considerable quantities of these more precious metals.

Cession to the United States.—Soon after the surrender of Santiago de Cuba to the American forces under General Shafter, July 17, 1898, an army numbering 16,973 men under General Miles, Wilson, Brooke and others, was sent from Guantanamo to Porto Rico to take possession of that island. They landed July 25, at Quánica, 15 miles W. of Ponce. Ponce surrendered July 27 to Commodore Davis, of the auxiliary cruiser "Dixie," who also had with him the "Annapolis" and "Wasp." Lieutenant Haines, commanding the marines, went ashore and raised the American flag over the custom house, amid the cheers of the people. General Wilson was the first army officer to land, and was welcomed with cheers and a serenade. A portion of the army marched toward the capital, San Juan, but were stopped when about half way by the suspension of hostilities between the belligerent powers. Under Article IV. of the protocol of peace the following commission was appointed to arrange and superintend the evacuation of the island by the Spaniards: For the United States, Maj.-Gen. John R. Brooke, Rear-Admiral Winfield S. Schley, and Brig.-Gen. William W. Gordon; for Spain, Maj.-Gen. Ortego y Diaz, Com. Vallarino y Carrasco, and Judge-Advocate Sanchez del Aguila y Leon. On Oct. 18 the island was formally surrendered to the United States in the city of San Juan.

Population.—In 1899 a census of the island was taken under the direction of the United States War Department, which by departments gave the following: Aguadillo, 99,645; Arecibo, 162,308; Bayamon, 160,046; Guayama, 111,986; Humacao, 88,501; Mayaguez, 127,566; and Ponce, 203,191—total for the island, 953,243. The population of the principal cities was: San Juan, 32,048; Ponce, 27,952; Mayaguez, 15,187; Arecibo, 8,008; Aguadilla, 6,425; Yauco, 6,108; Caguas, 5,450; Guayama, 5,334; Manati, 4,494; and Humacao, 4,428. See IMPERIALISM.

Port Phillip, the gate of Melbourne, discovered in 1802 by Lieutenant Murray, and named in honor of Captain Phillip, the first governor of New South Wales. Victoria itself was originally called the district of Port Phillip.

Port Royal

Port Royal, a celebrated convent of Cistercian nuns, situated near Chevreuse, about 15 miles from Paris. It was founded in 1204 and the nuns were of the order of St. Bernard de Citeaux. In 1625 they removed to Paris, where, in the Faubourg St. Jacques, they had a house, known as the Port Royal de Paris, while the house which they left received the name of Port Royal des Champs, and became occupied by a number of pious and learned men, who wished to lead a pious and secluded life, and were known as Les Solitaires de Port Royal. The most distinguished of this company were Claude Lancelot, the grammarian; Antoine Le Maistre, an advocate and one of the most distinguished orators of his time; Simon Léricourt, a distinguished officer; De Sacy, the eminent translator of the Bible; the two Arnaulds; Pierre Nicole, Blaise Pascal, and Nicholas Fontaine. The fame that they acquired for their learning and sanctity aroused the jealousy of the Jesuits, and was the cause of a long contest that prevailed between the two parties, which at length led to the suppression of the Port Royal des Champs, by a bull of Pope Clement XI. in 1708. The special subject of the controversy was the Jansenistic opinions held by the Port Royalists. See JANSENISTS.

Port Said, a town of Egypt, on the W. side of the Suez Canal, on a desolate strip of land between Lake Menzaleh and the Mediterranean. The place owes its origin to the Suez Canal, being named after Saïd Pasha, its promoter, and depends wholly on the canal trade, being mainly a coaling station for steamers. Pop. 42,095.

Portsea Island, a small island on the S. coast of Hampshire, England; has on its W. side Portsmouth Harbor and on its E. side Langston Harbor; and is separated from the mainland on the N. by a narrow channel, crossed by several bridges. It is 4 miles long by from 2 to 3 broad, and contains the towns of Portsea and Portsmouth.

Portsmouth, a city, port of entry, and county-seat of Rockingham co., N. H., on the Piscataqua river, and the Boston and Maine railroad; 40 miles E. of Concord. The harbor is deep and commodious, and much used as a haven of refuge. Here are a United States life-saving station, a signal-service station, custom-house, Children's Home, Woman's Asylum, two libraries, street railroad and electric light plants, waterworks, several National and savings banks, and a number of daily and weekly newspapers. It has manufactories of cotton fabrics, hosiery, ale and beer, boots and shoes, carriages, copper and brass foundry products, leather, soap, gloves, etc., and an assessed property valuation of over \$8,500,000. What is officially known as the Portsmouth Navy Yard is situated in Maine, on

Portsmouth

the E. side of the Piscataqua river. Pop. (1900) 10,637; (1910) 11,269.

Portsmouth, a city and county-seat of Scioto co., O.; at the confluence of the Scioto and Ohio rivers, on the Ohio canal, and on the Baltimore and Ohio Southwestern, the Norfolk and Western, and the Cincinnati, Portsmouth, and Virginia railroads; 114 miles S. E. of Cincinnati. It is the center and shipping port of a large mining and agricultural region. Here are a public library, United States government building. Old Ladies' Home, business colleges, electric lights, electric street railroads, waterworks, National and savings banks, and several daily and weekly newspapers. The industrial plants include rolling mills, iron and steel works, shoe factories, lumber mills, planing mills, flour mills, foundries, distilleries, fire-brick kilns, wheel works, and veneer works; and the assessed property valuation is \$5,500,000. Pop. (1900) 17,870; (1910) 23,481.

Portsmouth, a city and county-seat of Norfolk co., Va., on the Elizabeth river, and on the Seaboard Air Line, Atlantic and Danville, the Chesapeake and Ohio, Atlantic Coast Line, and the New York, Philadelphia and Norfolk railroads; opposite Norfolk. It is the seat of a naval hospital and marine barracks, and in Gosport, on the S. E. edge of the city, is the Norfolk Navy Yard. The harbor is one of the best on the coast, and is accessible by the largest vessels. It has a steamboat line to Baltimore, and regular water connections with the chief coast cities of the United States. Here are street railroads, electric lights, an academy and seminary, the shops of the Seaboard Air Line railroad, several State banks, and a number of daily and weekly newspapers. Portsmouth exports large quantities of cotton, lumber, fruits, naval stores, pig-iron, staves, etc. The assessed property valuation is nearly \$7,000,000. Pop. (1900) 17,427; (1910) 33,190.

Portsmouth, the principal station of the British navy, a seaport, municipal and parliamentary borough of England, in Hampshire, on the S. W. extremity of the island of Portsea. It consists of the four districts, Portsmouth proper, Portsea, Landport, and Southsea. Portsmouth proper is a garrison town. The best street is the High street, which contains the principal shops, hotels, and places of business. Portsea is the seat of the naval dockyard; Landport is an artisan quarter; and Southsea on the E. side of the town of Portsmouth is a favorite seaside resort, and commands fine views of Spithead and the Isle of Wight. Southsea Castle with its adjacent earthworks, the batteries of the Gosport side, and the circular forts built out in the roadstead, command the entrance to Portsmouth Harbor. The Island of Portsea,

Portsmouth

which is separated from the mainland by a narrow creek called Portsbridge Canal, is bounded on the E. by Langston Harbor, on the W. by Portsmouth Harbor, and on the S. by Spithead and the Harbor Channel. The royal dockyard covers an area of about 500 acres, and is considered the largest and most magnificent establishment of the kind in the world. Inclosed in a wall 14 feet in height, and entered by a lofty gateway, it includes vast store houses, containing all the materials requisite for naval architecture; machine shops, with all modern appliances; extensive slips and docks, in which the largest ships of the navy are built or repaired; ranges of handsome residences for the officials, and a Royal Naval College, with accommodation for 70 students. Outside the dockyard an area of 14 acres contains the gun wharf, where vast numbers of guns and other ordnance stores are kept, and an armory with 25,000 stand of small arms. Portsmouth has no manufactures of any consequence, except those immediately connected with its naval establishments, and a few large breweries. Its trade, both coasting and foreign, is of considerable extent. Of late years an extensive and systematic series of fortifications has been under construction for the complete defense of Portsmouth. They extend along a curve of about $1\frac{1}{2}$ miles at the N. side of Portsea Island. A series of hills, 4 miles to the N. of Portsmouth, and commanding its front to the sea, are well fortified with strong forts. On the Gosport side a line of forts extends for 4 miles. The municipal and parliamentary borough includes nearly the whole of the island of Portsea. It sends two members to the House of Commons. Pop. (1901) 189,160.

Portsmouth of the Steppes, the city of Bacu, on the Caspian Sea. It is a large shipping and commercial center.

Port Townsend, city, county-seat of Jefferson co., Wash., port of entry for Puget Sound; lies at the head of the Strait of Juan de Fuca on Port Townsend bay, and on the N. Pacific and the P. T. Southern railroads. Through the strait it has steamship connection with the Pacific and the coast, through the sound with the chief cities of Washington—Whatcom, Seattle, Tacoma, Olympia, and all the smaller ports of the sound valley. The town is built partly on the low shore and partly on a steep bluff behind it, reached by flights of stairs. The harbor is of the very first class, both as to size and water-depth, and its valuable surroundings are protected by Fort Townsend and other U. S. fortifications of modern equipment. The government has here a quarantine station, hospital, etc. The town is well planned and substantially built; the Custom House, City Hall, County Court House, St. John's Hospital, sani-

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tarium, high school, public schools, public blocks and residences bear witness to prosperity. The superb scenery of mountain, forest and water views, and the agreeable, equable climate, are most attractive.

As a commercial center, Port Townsend is a busy place. In the midst of a region of greatly varied industries—fishing, agriculture, lumbering, dairy farming, fruit-growing, oil-pumping, exploitation of minerals, etc., it exports their products and imports matters for their necessities. In 1902 its receipts as a port of entry were \$12,752,000, and its exports \$34,720,000,—in all, \$47,478,000. The industries of Port Townsend are, first in importance, the great Irondale Furnaces on the bay, the pig iron from which is one of the largest exports, and its quality such that it was used at San Francisco in the building of the battleships "Oregon", "Charleston", and others. There are also lumber mills, a ship-yard, boiler works, fish-curing works and canneries, flour mills, grain elevators, bottling works, etc. Pop. (1900), 3,443.

Portugal, a former kingdom of Europe, proclaimed a republic, after a short revolution, Oct. 5, 1910; bounded by Spain and the Atlantic; between lat. $36^{\circ} 57'$ and $42^{\circ} 8' N.$, and lon. $6^{\circ} 15'$ and $9^{\circ} 32' W.$; area, 36,038 square miles; pop. 5,687,627.

Topography.—The country generally inclines from N. E. to S. W. Several of the great mountain chains of Spain intersect it from E. to W. and terminate in large promontories in the Atlantic. The most remarkable of these chains is the Serra da Estrella, nearly in the center of Portugal. This chain is a continuation of the Serra de Gata, and culminates in an elevation of 7,524 feet above the level of the sea. Another chain is the Serra de Monchique, the extremity of which, Cape St. Vincent, is the S. W. point, not only of Portugal, but of Europe. The principal rivers are the Tagus, the Douro, the Minho, and the Guadiana. These all enter the country from Spain, and with the Mondego and the Sado, which have their sources in Portugal flow W. to the Atlantic Ocean. The climate is generally healthful.

Productions.—Wheat, barley, oats, flax, hemp, vines, and maize in the elevated tracts; rice in the low grounds, with olives, oranges, lemons, citrons, figs, and almonds. Silk is made of a very good quality. There are extensive forests of oak in the N., chestnut in the center, and the sea pine and cork in the S. Oxen are employed as beasts of draught, and mules and asses as those of burden. Cattle, sheep, goats, and swine are numerous, and fish abound in the rivers and on the coasts. Iron mines are worked, and the mountains abound in fine marble, and contain traces of gold and silver. Of salt, large quantities are formed in bays

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along the coast, by natural evaporation. There are numerous salt marshes, and upward of 200 mineral springs. The manufactures are limited, principally consisting of woollens, silk, and earthenware. Cotton spinning is followed, and paper, glass, and gunpowder are made in a few places. For a long time past the import and export trade has been managed chiefly by foreign merchants, particularly British, settled in Lisbon and Oporto.

Commerce.—The exports consist almost entirely of wine, salt and wool, and aggregated (1898) \$34,000,000; imports, chiefly corn, flour, fish, woollens, linen, cotton, lace, hardware, hats, shoes, and stockings, value (1898) \$51,000,000. The state religion is the Roman Catholic; but all others are tolerated. The government, prior to the revolution of 1910, when a republican administration was established, was a limited monarchy, with a National Assembly of Peers and Deputies. For defense see *Armies of the World* under ARMY, and *Navies of the World* under NAVY.

History.—Portugal forms the greater part of ancient Lusitania. It was subjugated by the Romans, in the time of Augustus, and was constituted into a province. In the 5th century, on the overthrow of the Roman supremacy, Portugal was invaded by the Alans and Visigoths, and suffered with Spain, of which it was then a part, all the troubles and vicissitudes endured by the inhabitants of the peninsula till the 8th century, at which time the Arabs, called indifferently Saracens or Moors, possessed themselves of the whole of Portugal, and kept absolute dominion for nearly 400 years. In the 12th century, Don Alonzo Henriquez, a Spanish prince of Leon and Castile, gained a great victory over the Moors of Portugal, and carried out his military operations with such success that his troops hailed him with one voice as king, a dignity which the people confirmed with the liveliest demonstrations of joy. Don Alonzo had no sooner received the crown, than he set himself to consolidate his power and attend to the administration of law and justice; first, however, he renounced all dependence on Spain, politically separated his new kingdom from all connection or authority with the Spanish crown, and established a free and sovereign state.

Under the descendants of Don Alonzo I., especially Dennis I. and Alonzo IV., Portugal, during the next two centuries, rose in political importance and commercial prosperity, the kingdom being respected abroad, and the people rendered happy and prosperous at home. In 1385, the King of Castile having laid claim to the crown of Portugal on the death of Ferdinand, was opposed and defeated by Don John, Ferdinand's brother, and ascending the vacant throne, ruled his subjects with justice and

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prudence. Under this wise and enlightened sovereign the Portuguese first directed their attention to those maritime adventures which subsequently placed Portugal at the head of all European nations. Under John I. the Portuguese first projected those Atlantic discoveries on the African coast, fraught with such territorial and commercial advantages to the nation; and, under John II. and Emanuel, between 1481 and 1521, Vasques de Gama explored the Indian Ocean; the riches of the East began to pour into Europe; Goa became a prosperous possession, and Brazil was added to the possessions of the crown of Portugal. The latter monarch, Emanuel, has been regarded as the greatest and best man that ever sat on a throne. Under his wise, just, and benevolent reign, distress was banished from the kingdom, and his subjects rendered rich and happy. Sebastian III., fired with a holy zeal to exterminate the infidels from his country, commenced a sanguinary crusade against the Moors, which he carried on through such repeated defeats, that he eventually lost both his crown and life in the struggle. Henry the Cardinal, his uncle, an old man of 70, ascended the throne, but died without heirs, after a reign of only two years, in 1580.

With Henry terminated the male line, after enduring for 460 years. Spain once more laid claim to the vacant throne, and Portugal again became a dependency of the Spanish crown, the nation suffering all the injustice, exactions, and tyranny usually inflicted on a conquered country by its haughty masters. After enduring 60 years of intolerable hardships and exactions, a Portuguese nobleman named John, Duke of Braganza, pitying his unfortunate countrymen, excited a revolution, which again broke the Spanish fetters, while the people hailed their deliverer as their king, who, being crowned as John IV., commenced the dynasty of the House of Braganza, a family whose descendants still sway the destinies of Portugal. When Napoleon, in 1807, entered the country, and declared the family of Braganza had ceased to reign, the royal family of Portugal, consisting of Pedro, the old king, and his imbecile wife, Maria Frances Isabella, queen-regent, the prince-regent, and all the court, set sail from the Tagus to Brazil. At the death of Queen Maria da Gloria her eldest son ascended the throne, in 1853, as Pedro V., who died prematurely in 1861, leaving the throne to Luiz I., second son of Dona Maria. In October, 1889, Carlos I., his son, succeeded to the throne. He was assassinated, together with the crown prince, while driving through Lisbon, Feb. 1, 1908, and was succeeded by his second son, MANUEL II. (*q. v.*). In the revolution in Lisbon in 1910, all members of the royal family escaped without harm.

Portuguese Man-of-War

Portuguese Man-of-War. See PHY-SALIA.

Portulaca, purslane; the typical genus of the *Portulacaceæ*; low, succulent herbs with flat or cylindrical leaves, and yellow, purplish, or rose-colored ephemeral flowers. Known species between 30 and 40; most of them from the warmer parts of America. *P. oleracea* is the common purslane. It is a low, succulent annual, often eaten by the Hindus as a potherb. *P. quadrifida*, also Indian, is eaten and considered cooling by the natives. The fresh leaves of both species are used as an external application in erysipelas, etc., and an infusion of them as a diuretic.

Portulacaceæ, or **Portulaceæ**, purslanes; an order of hypogynous exogens, alliance Silenales. Succulent herbs or shrubs, generally with alternate, entire leaves; axillary or terminal flowers, which expand only in bright sunshine. Sepals two; petals five, distinct, or joined into a tube; stamens varying in number; carpels three or more; ovary and capsule one-celled, the latter dehiscent transversely, or by valves (Lindley). Known genera 15, species 125 (Sir Joseph Hooker).

Portumnus, or **Portunus**, the Roman god of harbors. The Portumnalia were yearly celebrated in his honor.

Pose, in heraldry, a term applied to a lion, horse, etc., represented standing still, with all his feet on the ground; statant.

Poseidon, the Greek god of the sea, identified by the Romans with the Italian deity Neptunus. A son of Kronos and Rhea, and hence a brother of Zeus, Hera, and Demeter, he was regarded as only inferior in power to Zeus. His usual residence was in the depths of the sea near Ægæ, in Eubœa, and the attributes ascribed and most of the myths regarding him have reference to the phenomena of the sea. The horse, and more particularly the war horse, was sacred to Poseidon, and one of the symbols of his power. During the Trojan war Poseidon was the constant enemy of Troy, and after its close he is described as thwarting the return of Ulysses to his home for his having killed Polyphemus, a son of the god. Poseidon was married to Amphitrite. His worship was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns. The Isthmian games were held in his honor. In works of art Poseidon is represented with features resembling those of Zeus, and often bears the trident in his right hand. A common representation of him is as drawn in his chariot over the surface of the sea by hippocamps (monsters like horses in front and fishes behind) or other fabulous animals.

Posidonius

Posen, a fortified town in Prussia, capital of the province of the same name and an archbishop's see, stands on the Warthe, 149 miles E. by S. of Berlin. It is surrounded by two lines of forts, is built with considerable regularity, has generally fine wide streets, and numerous squares or open



POSEIDON AND AMPHITRITE.

spaces. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the town house (1508), with a lofty tower; the Raczynski Library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc. There are also breweries and distilleries. Pop. 136,808. The province is bounded by West Prussia, Russia Poland, Silesia, and Brandenburg; area, 11,178 square miles. Pop. 1,986,637. The surface is flat, and extensively occupied by lakes and marshes. A small portion on the N. E. belongs to the basin of the Vistula; all the rest to the basin of the Oder. The soil is mostly of a light and sandy character, yielding grain, millet, flax, hemp, tobacco, and hops. Forests occupy 20 per cent. of the surface. The inhabitants include many Germans, especially in the towns, but considerably more than half are Poles, Posen being one of the acquisitions which Prussia made by the dismemberment of Poland. It is divided into the governments of Posen and Bromberg.

Poses Plastiques, or **Tableaux Vivants**, imitations of pictures by living persons representing those depicted. Such exhibitions are often very realistic.

Posidonius, a Greek Stoic philosopher; born in Apamea, Syria, but styled "The

Rhodian" by reason of his long residence in the island of Rhodes; lived from 135 to 50 B. C. He was one of the most learned men of antiquity, his knowledge and his writings extending over every branch of science. His greatest work was a universal history in 52 books, held in high esteem by the ancients; it was a continuation of Polybius, and covered the period 145-82 B. C. His lectures on "Tactics" would seem to be the basis of the tractate of his disciple Asclepiodotus on the same subject.

Posilipo, a mountain of Italy, on the N. W. of Naples, close by the city, from of old a noble site for the villas of wealthy citizens. It is remarkable for the tunnel known as the Grotto of Posilipo, through which the road from Naples to Pozzuoli passes. The grotto varies in height from 20 feet to 80 or more, is 20 to 30 feet wide, and 755 yards long. It is traditionally said to have been made in the reign of Augustus, but is probably earlier. Above the eastern archway of the grotto is the so-called "Tomb of Vergil." At the base of the hill anciently stood the poet's villa. During the Middle Ages the common people believed the grotto to be the work of the poet, whom they regarded as a great magician. Two other tunnels penetrate through the hill, one to the N. of the grotto, 800 yards long, 39 feet high, and 33 feet broad, made for the tramway, and another constructed at the command of Agrippa in 37 B. C., but only discovered in 1812.

Positive, in photography, a picture obtained by printing from a negative, in which the lights and shades are rendered as they are in nature. See PHOTOGRAPHY.

Positive Philosophy, the system of philosophy outlined by Auguste Comte (1798-1857) in his "Philosophie Positive," the sixth and last volume of which was published in 1842. It is the outcome of the Law of the Three Stages and is based on the positive sciences, taken in the following series: mathematics (number, geometry, mechanics), astronomy, physics, chemistry, biology, and sociology. It relinquishes attempts to transcend the sphere of experience, and seeks to establish by observation and induction laws or constant relations, and resigns itself to ignorance of the agents. In the opinion of its founder it is capable of being developed into a religion and a polity.

Positive Society, a society founded in Paris in 1848, by Comte, in the hope that it might exert as powerful an influence over the revolution as the Jacobin Club had exerted in 1789. In this he was disappointed, but the disciples who gathered around him were the germ of the Positivist Church.

Positivism, the religion of Humanity, developed from the positive philosophy, and

claiming to be a synthesis of all human conceptions of the external order of the universe. Its professed aim, both in public and private life, is to secure the victory of social feeling over self love, of altruism over egotism.

Posse Comitatus, a force or body which the sheriff of a county is empowered to raise in case of riot, possession kept on forcible entry, rescue, or other attempt to oppose or obstruct the execution of justice.

Possession, a word having several applications: 1. The act or state of possessing or holding as owner or occupant; the state of owning or being master of anything; the state of being seized of anything; occupancy; ownership, rightful or wrongful. 2. That which is possessed; property, land, estate, or goods owned. 3. A district, or extent over which a person or thing has power or authority. 4. The state of being possessed or under the power of evil spirits, passions, or influences; madness, lunacy. 5. An idea, a prepossession, a presentiment.

In civil law, the holding or having as owner or occupier, whether rightfully or wrongfully; actual seizing or occupancy. In international law, a country or territory held by mere right of conquest. In Scriptures, the taking possession of the body or spirit by demons or devils. They produced bodily disease or defect as dumbness (Matt. ix: 32-34), blindness and dumbness (xii: 22-30), epilepsy with dumbness (Mark ix: 17-27); and a woman who had had a spirit of infirmity 18 years is described as bound that length of time by Satan (Luke xiii: 16). Mentally, the possession by an unclean spirit produced symptoms almost undistinguishable from those of madness (Mark v: 2-20). Jesus, when on earth, cast out demons (Matt. iv: 24).

Possession Theory, the theory prevailing among races and individuals of low culture that disease, whether bodily or mental, is due to the presence of a malevolent spirit.

Posset, a drink composed of hot milk curdled by some infusion, as wine or other liquor.

Possiet, Constantin Nicolavich, a Russian naval officer; born in 1819; early entered the navy; was Minister of Ways of Communication in 1874-1888. While holding this office he made extensive improvements in the harbors and waterways of Russia; was president of the Russian Association for Saving Life, and established most of the life stations in Russia. From 1889 to 1899 he was a member of the Council of State. He died in St. Petersburg, May 8, 1899.

Post, Charles Cyrel, an American politician; born in Shiawassee, Mich., May 16, 1846; studied at Hiram and Oberlin Col-

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leges, Ohio; was admitted to the bar in 1874; then entered journalism. He was a leader in the greenback movement and organized the anti-monopoly movement that nominated General Butler for President. He settled in Florida in 1892 and in 1899 founded the School of Scientific Philosophy and Psychic Research. He wrote "Metaphysical Essays"; "From Wabash to the Rio Grande"; etc.

Post, George Browne, an American architect; born in New York city; studied with Richard M. Hunt; designed numerous private residences and public buildings; and became president of the American Institute of Architects, the National Art Club, and the American Society of Civil Engineers.

Postal Service, the regulation of communication between different parts of a country, or different countries, including especially the forwarding and delivering of letters, newspapers and small packages, and the establishment of a registry system for the transfer of money and the transaction of other financial business. In some countries the use of the telephone and the telegraph forms a part of the postal service. Though letter conveyance is the primary work of the postoffice, many other branches of business have been assumed by it. The word "post" has its particular application from the posts, or stages, at which on the roads of the Roman empire couriers were maintained for the purpose of conveying news and dispatches.

Postal Union.—Under the terms of a treaty concluded at Berne, Oct. 9, 1874, the object of which was to secure uniformity in the treatment of correspondence, and the simplification of accounts, as well as the reduction of rates within certain limits, and whose provisions were carried into operation generally July 1, 1875, the whole of Europe, the United States, Egypt, British India, and all the colonies of France were at the outset, or shortly thereafter, included in the union and many other countries and colonies have since joined it. The international accounts in respect of postages are based on a month's return of correspondence taken every third year.

United States.—The beginnings of a postal service in the United States date from 1639, when the house of Richard Fairbanks in Boston was employed for the receipt and delivery of letters for or from beyond the seas. He was allowed for every letter a penny and was obliged to answer all mis-carriages through his own neglect. In 1672 the government of New York colony established "a post to go monthly from New York to Boston"; in 1702 it was changed to a fortnightly one. A general postoffice was established and erected in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was

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appointed in 1692; and by act of Parliament in 1710 he was directed to keep his principal office in New York, "and other chief offices in some convenient place or places in other of Her Majesty's provinces or colonies in America"; a monopoly was established which included also the transport of travelers, and a tariff was fixed. The system, however, proved a failure, till 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded \$15,000.

In 1789, when the postoffice was transferred to the new federal government, the number of offices in the 13 States was only about 75. Events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847), of stamped envelopes (1852), of the system of registering letters (1855); the establishment of the free-delivery system, and of the traveling postoffice system (1863); the introduction of the money order system (1864), of postal cards (1873), and, between the last two dates of stamped newspaper wrappers, and of envelopes bearing requests for the return of the enclosed letter to the writer in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal notes" payable to bearer (1883); and the establishment of a special-delivery system (1885), under which letters bearing an extra 10-cent stamp are delivered by special messengers immediately on arrival.

At the present time the postal establishment of the United States is the greatest business concern in the world. It handles more pieces, employs more men, spends more money, brings more revenue, uses more agencies, reaches more homes, involves more details and touches more interests than any other human organization, public or private, governmental or corporate. Though the postal service of England, France and Germany, includes the telegraph, the postal business of the United States surpasses the service of any of those countries. The annual report of the postmaster-general for the fiscal year ending June 30, 1901, makes the following statement:

Ordinary postal revenue.....	\$109,531,778.67
Receipts from money order business	1,668,659.29
Receipts from unpaid money orders	
more than one year old.....	430,755.43
<hr/>	
Total receipts from all sources..	\$111,631,193.39
Total expenditures for the year....	115,554,920.87
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Excess of expenditures over receipts	\$3,923,727.48

While the expenditures in the ordinary development and through various extensions of the service are \$7,814,652.88 greater than for the preceding year, the deficit is \$1,461,961.22 less. Under present prosperous conditions the annual increase of re-

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ceipts is larger than the increase of outlay, and for several years the deficit has been steadily growing smaller.

The estimates for the fiscal year ending June 30, 1903, are as follows:

Total postal revenue for 1901.....	\$111,631,193
Add 9 per cent. for estimated increase year ending June 30, 1902.....	10,046,807
Estimated revenue for 1902.....	\$121,678,000
Appropriation for postal service for 1902	123,782,688
Estimated deficit for 1902.....	\$2,104,688
Estimated revenue for 1902.....	\$121,678,000
Add 8½ per cent.....	10,342,630
Estimated revenue for 1903.....	\$132,202,630
Estimated expenditures for 1903.....	\$134,731,576
Estimated deficit for 1903.....	\$2,710,946

Money order transactions, during the fiscal year ending June 30, 1901, amounted to \$294,618,680.99, an increase over the previous year of \$39,000,000. The number of money order offices at the close of the year was 30,529, an increase of 880. The free delivery system in cities served 32,000,000 patrons at a cost of 50 cents a year each. The length of domestic or inland mail routes was increased during the year by 10,818 miles, or 6,940,285 miles in annual travel, the total number of such routes of all classes at the end of the fiscal year being 35,316, aggregating 511,808 miles in length and an annual travel of 466,146,059 miles. This service involved an expenditure of \$56,810,242.05, an increase of \$1,664,182.29 over the previous year. The Alaskan service comprised 29 routes, with a length of 22,059 miles, involving annual travel of 665,067 miles, at a cost of \$293,046.99.

The revenue from Cuba for the fiscal year 1900 was \$246,912.31, and for the fiscal year 1901 it was \$367,634.50, showing an increase of \$120,722.19. This increase was due, not to an expansion of the postal business, but to a faithful accounting of moneys received. The expenditures for the fiscal year 1900 were \$598,497.69, and for 1901 they were \$451,437.89, showing a decrease of \$147,059.80. The deficit was thus reduced from \$352,585.38 to \$83,803.39. In the Philippine Islands the service has been somewhat extended as the general conditions have improved and the need for intercommunication has been increased. This extension has entailed larger cost, and the expenditures have, for the first time, passed the receipts, the deficit for the year being \$36,470.06. Outside of Manila and the larger towns nearly all the revenue is derived from the army and the employes of the government.

The rural free delivery has advanced with increased strides. Its extension in the fiscal year 1901 was nearly three times as great as the whole amount of service

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routes in operation at the beginning of the fiscal year was 1,276, and at the close 4,301. The number will increase by July 1, 1902, to 8,600. The rural population now receiving daily service is about 4,000,000, and at the end of the fiscal year 1902 it will reach 5,700,000. The delivery system will then cover more than a quarter of the eligible portion of the country, and at the present rate of establishment the entire area suited to the service—that is, as estimated, a million square miles of territory, with 21,000,000 of rural residents—will be brought within its scope in less than four years. The mail will then, if the work goes on, be delivered at every door in the United States except in the most remote, mountainous and sparsely settled sections, and in villages of limited receipts where the postoffice is within easy reach.

At the Dead Letter office in Washington in 1899 there were received 6,855,983 pieces of mail matter. Of this number there were 4,903,700 ordinary unclaimed letters; 593,194 which originated in foreign countries; 367,469 misdirected letters and parcels; 71,919 without address, inclusive of envelopes containing money found loose in the mails; 294,739 domestic hotel letters; 167,675 unclaimed parcels and photographs. There were restored to owners unopened 756,013 letters and parcels. 6,101,590 letters and parcels were opened. Of these, there were returned to senders 25,016 letters containing money to the amount of \$27,409.16; 32,033 letters containing drafts, notes, and other valuable inclosures of the face value of \$1,022,838.77; 1,772,464 ordinary letters (correspondence) without valuable inclosures; 71,248 parcels of merchandise, books, etc.; 38,998 letters containing miscellaneous papers, etc.; 167,608 containing postage stamps; and 36,532 containing photographs. Over 45,000 unclaimed and undelivered parcels of merchandise, books, etc., were disposed of at public auction, and 580,366 unclaimed foreign letters and parcels were returned to countries of origin. The growth of the postal business is phenomenal, and can be shown in no better way than by contrasting it with that of the department during Washington's administration, when the Postmaster-General's balance sheet of expenditures and receipts for a whole quarter of a year showed an aggregate of \$63,000, which is the expenditure of every six hours at the present time. Even as late as 1880, the revenues and expenses were but little over a third of what they were in 1899. Within these 18 years the population has increased one-half, while the volume of the postal business has multiplied three-fold. As an example of the care with which the postal service is managed, the marine service on

Postal Service

the Great Lakes at the mouth of the Detroit river may be mentioned. At that point, during the open season of eight months, a steamship passes every three and a half minutes day and night, the total tonnage exceeding that entering the ports of New York and Liverpool in a whole year. Every steamer is visited and mail collected and delivered without the vessel's even slowing up. Letters are stamped on the back, each with the name of the steamer it is intended for, in characters so large that they can be read by lamplight. They are then enclosed in water-tight bags, so that should they fall into the water they would not be injured, and then hauled on board. Then there is the placing of letter boxes on the street cars, and the attachment of postal collection and distributing cars to the electric street-car lines; the free delivery system extended in many sections to the rural districts; and other details all looking to the perfecting of the service. The railway postoffice is the artery of the whole system. It was started in 1864, and the number of clerks on the roll Aug. 25, 1900, was 8,854. The number of miles of railroad covered by the service in 1899 was 176,727. Total mileage of the postal cars was 287,591,269. The number of pieces of mail distributed in railway postal cars in 1899 was 13,351,992,725.

The old system of distributing offices has been abandoned and delay is avoided by having the mails handled, sorted pouched and delivered in the postal car. The railway postal clerks are required to pass a rigid examination; to memorize the whole scheme, and to submit to what are known as "case examinations." When this method of examination was instituted in 1872, the distribution averaged one error to every 720 letters. From that time onward the ratio of errors steadily declined until in 1884 it was found that 4,152 pieces were distributed correctly to every error made. Some changes being made in the personnel of the service, the ratio of errors increased till in 1888 it was one in every 3,694, and in 1890 one in every 2,384. Since that year the examination requirements have been more strictly enforced, and at the present time only one error is made to every 10,428 pieces distributed correctly. Fast mail trains now run between the most important cities, and, in order to save time by stoppages, the catcher-pouch service has been established, and by this arrangement the mail bags are caught from and thrown into the postal car without slowing the trains. The train service is hazardous, as is illustrated by the fact that since 1889, 69 clerks have been killed, and 1,324 injured by accidents while they were at their post of duty. "Star routes" are those where the inland mail is transported on other than railroad

Post Obit

or steamboat routes, and are so called because designated on the route registers by three stars. The longest of these routes now in operation is that from Juneau, Alaska, via Circle City in the same territory, along the Yukon river to Tanana, a distance of 1,618 miles, connecting with the next longest route which runs from Tanana to St. Michaels, a distance of 900 miles. The money-order division is an important branch of the postal service. The number of money orders issued in 1899 was about 30,000,000 covering an amount in the aggregate of 225,000,000. The foreign mail service has also been much improved and a uniform foreign rate has been established; within a short period the parcels post has been instituted with 16 countries and colonies in this hemisphere, in which packages of merchandise, up to 11 pounds in weight, may be sent by mail either way at a minimum of cost. Since Cuba, Porto Rico, and the Philippines have come under the authority of the United States, it has become necessary to reconstruct the mail system in those islands, and already a vast improvement has been made in the service established there by the government.

Poste Restante, a department in a post-office where letters so addressed are kept till the owners call for them. It is for the convenience of persons passing through a country or town where they have no fixed residence.

Postern, in fortification, is a small gate usually in the angle of the flank of a bastion, or in that of the curtain, or near the orillon, descending into the ditch.

Post Glacial, in geology, a term applied to the oldest division but one of the post-Tertiary period.

Posting, traveling by means of horses hired at different stations on the line of journey, a system established in England as early as the reign of Edward II.

Postmaster-General, the chief of the postoffice department.

Post Mill, a form of wind mill so constructed that the whole fabric rests on a vertical axis, and can be turned by means of a lever.

Post Mortem, after death, as a post mortem examination, *i. e.*, one made after the death of a person, in order to ascertain the cause of death either in the interests of science, or for the ends of justice.

Post Obit, a bond given as security for the repayment of a sum of money to a lender on the death of some specified person, from whom the borrower has expectations. Such loans in almost every case carry high, if not usurious, rates of interest, and generally the borrower binds himself to pay a much larger sum than he receives, in con-

Postoffice Department

sideration of the risk which the lender runs in case of the borrower dying before the person from whom he has expectations.

Postoffice Department, one of the executive departments of the United States government; established in 1794. It is under the management of the Postmaster-General, who since the time of Andrew Jackson, has been a member of the President's Cabinet. He is appointed by the President and confirmed by the Senate. The department is divided into four great bureaus each under the immediate charge of an assistant postmaster-general. The first assistant's bureau has charge of the large clerical and carrier forces and all the matters of actual management. It supervises an annual expenditure of more than \$40,000,000. The bureau of the second assistant has the immense task of providing for the transportation of the mails at a yearly cost of \$35,000,000. That of the third assistant looks after the financial side, furnishes the stamps, and keeps the accounts. The fourth assistant has charge of the appointment of 75,000 postmasters and directs the force of inspectors. The United States postoffice department, unlike that of Great Britain, is carried on at a loss; this is due to the large amount of postal matter of certain classes carried at less than the cost of conveyance and distribution, and to some kinds of correspondence being carried altogether free.

Post-Pliocene, in geology, in the etymological sense, more modern than the Pliocene, *i. e.*, embracing all the deposits from the end of the Pliocene till now; but Lyell, who introduced the term, restricts it to the older of these, applying the term Recent to the others. In his post-Pliocene strata, all the shells are of recent species, but a portion, and that often a considerable one, of the mammals are extinct. In the Recent strata, again, both the shells and the mammals belong to recent species.

Post-Tertiary. See QUATERNARY.

Postulant, one who asks, demands, or requests; a candidate; specifically, in the Roman Church, one seeking admission to a religious order or congregation. The postulant is bound by the rules of the order to which he or she is seeking admission, but does not wear its distinctive dress till the habit is conferred.

Postulate, a position, supposition, or proposition assumed without proof, as being self-evident or too plain to require proof or illustration; a thing assumed for the purpose of future reasoning; an assumption. In geometry, the enunciation of a self-evident problem. It differs from an axiom, which is the enunciation of a self-evident proposition. The axiom is more general than the postulate.

Potassium

Potamogeton, in botany, pondweed; the typical genus of the tribe Potameæ; flowers perfect, sessile, on a spike, with a simple spathe; perianth single; stamens four; ovary of four carpels; drupes or achenes four; rarely one; small, green. Chiefly from the temperate zones. Known species about 50. They are found in ponds, ditches, streams, the margins of lakes, etc., having the leaves submerged and translucent, or floating and opaque. *P. natans*, *P. lucens*, *P. crispus*, *P. densus*, and *P. oblongus* are among the most common. The root of *P. natans* is said to be eaten in Siberia. *P. crispus*, *P. gramineus*, and *P. lucens* are used in India as fodder, and the first two also for refining sugar.

Potash, a term applied to the hydrate of potassium, KHO, either in the liquid or solid state, but sometimes used to denote potassium oxide and also crude carbonate of potassium. Potash salts are essential constituents in the human body, but if, when wasted, they are supplied directly to the blood they are very poisonous. A much diluted solution of potash is antacid and sedative in dyspepsia and cutaneous diseases, also in pleuritis, pericarditis, scrofula, etc. Caustic potash is used externally as a caustic in ulcers, etc.; carbonate of potash has been given in whooping cough; acetate of potash, nitrate of potash, and, in small doses, tartrate of potash are diuretics; acid tartrate of potash is purgative and used in dropsy; citrate of potash is diuretic and febrifugal; sulphate of potash is a mild purgative generally given with rhubarb, etc.; nitrate of potash and chlorate of potash are refrigerants and diuretics. Bromide and iodide of potassium are the forms in which bromine and iodine are often administered. Sulphurated potash in small doses is a stimulant, diaphoretic, and expectorant, and is sometimes used in scabies, psoriasis, chronic rheumatism, and bronchitis.

Potash Lime, a mixture of dry hydrate of potassium and quicklime employed in estimating the nitrogen contained in organic substances. At a high temperature, it liberates the nitrogen in the form of ammonia.

Potash Water, an artificial aerated water containing a minute quantity of potassic bicarbonate.

Potassium, symbol, K; at. wt., 39, a monad metallic element, discovered by Davy in 1807, and very widely diffused through the vegetable, mineral and animal kingdoms. It usually exists in combination with inorganic and organic acids, and, when its organic salts are burned, they are resolved into carbonate, from which all the other salts of potassium can be prepared. It may be obtained by electrolysis, but is now produced in large quantity by distilling

Potato

in an iron retort an intimate mixture of charcoal and carbonate of potassium, a condition readily obtained by igniting crude tartar in a covered crucible. It is a bluish-white metal; sp. gr., .865, being the lightest of all the metals except lithium. At 0° it is brittle and crystalline; soft at 15°, and may be easily cut with a knife; fluid at 62.5°, and at a red heat distills, yielding a beautiful green vapor. Thrown upon water, the metal decomposes it with great violence, forming hydrate of potassium, while the escaping hydrogen takes fire, burning with a rose-red color. It can only be preserved in the metallic state by immersing it in rock oil.

Potato, or Potatoe, *Solanum tuberosum*, a well-known plant, the tubers (dilated branches) of which are eaten. It is a native of Chile and Peru. Some think that it was first brought to Spain from the mountains near Quito early in the 16th century. Thence it spread to Italy and Austria. Sir Walter Raleigh is supposed to have taken it to England in July, 1586, having obtained it from the Virginian colonists who had left England in 1584. Gerarde, in his "Herbale," figured it in 1597 as "the potatoe of Virginia," where he said he had obtained its roots. Sir Walter Raleigh cultivated potatoes on his estate of Youghal, near Cork. For the next century and a half they were regarded as garden plants only. They gradually made way to the important position which they now occupy in agriculture. Many varieties are grown, differing in earliness, form, size, color, etc. The production of Irish potatoes in the United States in the calendar year 1909 was 376,537,000 bushels, valued at \$206,545,000. New York, Michigan, Maine, Wisconsin, Pennsylvania, Minnesota, Ohio, and Illinois were the most productive States, in the order given.

Potato Disease, a disease or murrain produced by a fungus, *Peronospora infestans*. It generally first attacks the leaves and stems of the plant, forming brown spots on them in July and August. By this time, the fungus which first penetrated the tissue of the leaf, has thrust forth through the stomates its conidia-bearing filaments. The leaves soon afterward die. Next the tubers are attacked and decay, either in a moist manner, attended by a disagreeable odor, or by a drying up of the tissue. Sometimes the term potato disease is limited to the first of these kinds of decay, but they are closely akin, the one form passing into the other. Possibly an excess of rain in particular seasons created a predisposition to the attacks of the fungus. Too strong manuring, and the cutting up of seed potatoes have also been suggested as predisposing causes. The potato disease first appeared in the United States.

Potential

In 1845-1847 it caused the failure of the potato crop in Ireland, producing famine. It has never since completely disappeared, and in 1860 was nearly as formidable in some places as on its first appearance. When it is prevalent, the potatoes should be powdered with flowers of sulphur before being planted. They should be put early in the ground, and the haulm removed when the disease manifests itself.

Potato Fly (*Anthomyia tuberosa*), a dipterous insect of the same genus with the radish fly, cabbage fly, turnip fly. In its perfect state it is very like the house fly. The maggots are often abundant in bad potatoes in autumn, and are different from the maggots of the house fly, being horny, spiny, bristly, and tawny; the long tail ending in six long bristles. The pupa is very like the larva. The potato-frog fly (*Euteryx solani*, Curtis) and the caterpillar of the death's-head moth (*Acherontia atropos*, Linn.) feed on the leaves and stems of potatoes, but rarely do serious damage.

Potemkin, Gregory Alexandrovitch, a Russian general, a favorite of the Empress Catharine II.; born in September, 1736; descended from an ancient Polish family, and early trained to the military profession, he soon after her accession attracted the attention of Catharine, who appointed him colonel and gentleman of the chamber. Soon after he gained the entire confidence of Catharine, and became her avowed favorite. From 1776 till his death, a period of more than 15 years, he exercised a boundless sway over the destinies of the empire. In 1783 he suppressed the khanate of the Crimea, and annexed it to Russia. In 1787, being desirous of expelling the Turks from Europe, he stirred up a new war, in the course of which he took Oczakoff by storm (1788). In the following year (1789) he took Bender, but as the finances of Russia were now exhausted Catharine was desirous of peace. Potemkin, however, resolved on conquering Constantinople, resisted the proposal to treat with the enemy, and went to St. Petersburg to win over the empress to his side (March, 1791); but during his absence Catharine sent plenary powers to Prince Repnin, who signed a treaty of peace. When Potemkin learned what had been done he set out for the army, resolved to undo the work of his substitute; but he died on the way, in Nicolaieff, Oct. 16, 1791.

Potented, or Potentee, in heraldry, an epithet applied to an ordinary when the outer edges are formed into potents, differing from what is termed potent counter-potent, which is the forming of the whole surface of the ordinary into potents and counter-potents like the fur.

Potential, in electricity, a term holding the same relation to electricity that level

does to gravity. The potential of the earth is taken at zero. Potential in physics is the sum of each mass-element of the attracting body divided by the distance of that element from the attracted point. Also, capable of being exerted, though not acting at the particular moment.

Potential Mood, that form of a verb which is used to express power, possibility, liberty, or necessity of an action or of being; as, he may go, you should write.

Potentilla, cinquefoil, the typical genus of *Potentillidæ*. Flowers white or yellow, rarely red; calyx, five, rarely four lobed, with as many small bracts; petals, five, rarely four; style, short, lateral, or nearly terminal; achenes, many, minute, on a small, dry receptacle. Chiefly from the N. temperate and Arctic zones. Known species, 120. Eight are under *Potentilla* proper, viz.: *P. reptans*, the common creeping; *P. verna*, the spring; *P. salisburgensis*, *alpestris*, or *aurea*, the Alpine; *P. fragariastrum*, the strawberry-leaved; *P. rupestris*, the strawberry-flowered, and *P. argentea*, the hoary cinquefoil; *P. tormentilla*, the tormentil, and *P. anserina*, the silver-weed. The other three are *P. comarum* (*Comarum palustre*), the marsh cinquefoil; *P. (sibbaldia) procumbens*, the procumbent sibbaldia, and *P. fruticosa*, the shrubby cinquefoil. The most common is the tormentil; the next is the strawberry-leaved cinquefoil, often mistaken for the wild strawberry, but is smaller, has silky leaflets, and flowers earlier, viz., from March to May. *P. reptans* is a febrifuge. *P. nepalensis* yields a red dye. Its roots are depurative; their ashes are applied with oil to burns. The leaves of *P. fruticosa*, a sub-Himalayan species, are used in parts of the Punjab as tea. The roots of *P. supina* are regarded in India as a febrifuge.

Poterium, in botany, salad-burnet; a genus of *Sanguisorbacæ*. Calyx single, four-cleft, petals none, stamens many, stigma tufted. Found in the N. temperate zone; known species 20.

Potenza, a town of Southern Italy; in a valley of the Apennines; 103 miles E. by S. of Naples. It is surrounded by a wall, has a fine cathedral, and disused fortifications. Potenza was shaken by earthquakes in 1273, 1694, 1812, and 1857. Pop. (1898) 20,257; (1901) 16,186.

Pot Herbs, not, as might be supposed from the name, the vegetables chiefly used for culinary purposes, as supplying articles of food, but rather those which are of secondary importance, and valuable chiefly for flavoring, as parsley, fennel, etc.

Poti, a seaport of Russian Caucasus; at the mouth of the Rion river, on the E. shore of the Black Sea, 200 miles W. of Tiflis. Here maize and manganese are

shipped to the annual value of \$1,830,000. The imports do not exceed \$10,000. Poti was seized by Russia in 1828.

Potidæa, a Corinthian colony founded on the W. isthmus of the Chalcidice peninsula in ancient Macedonia. By its revolt from the Athenian League (432 B. C.) it brought on the Peloponnesian war; it was besieged and taken by the Athenians (429 B. C.). The Athenian colony which was then settled there was destroyed by Philip of Macedon (356 B. C.). Cassander built up a new town, and called it Cassandria; this flourished greatly till it was captured and sacked by the Huns.

Potier, Charles Joseph Edward (pôt-yā'), a French dramatist; born in Bordeaux, France, in 1806. His principal dramatic works are: "Factor" (1834), a five-act drama with Charles Desnoyer and Boulé; "Because" (1835), "The Drunkard's Sister" (1839), one-act vaudevilles; "Everybody's Master" (1840), a two-act comedy with Antony Béraud; "The Clothing Merchant" (1841), a five-act drama with Desnoyer and Béraud; "Estelle and Némorin" (1844), a two-act pastoral bouffe; and "The National Sickness" (1846), a three-act vaudeville with Brissebarre. He died in Paris, in 1870.

Pot Metal, a cheap alloy for faucets; etc.; composed of copper, 10; lead, 6-8. (2) A kind of cast-iron suitable for casting hollow ware. (3) A species of stained glass, the colors of which are incorporated with the glass while the latter is in a state of fusion in the pot.

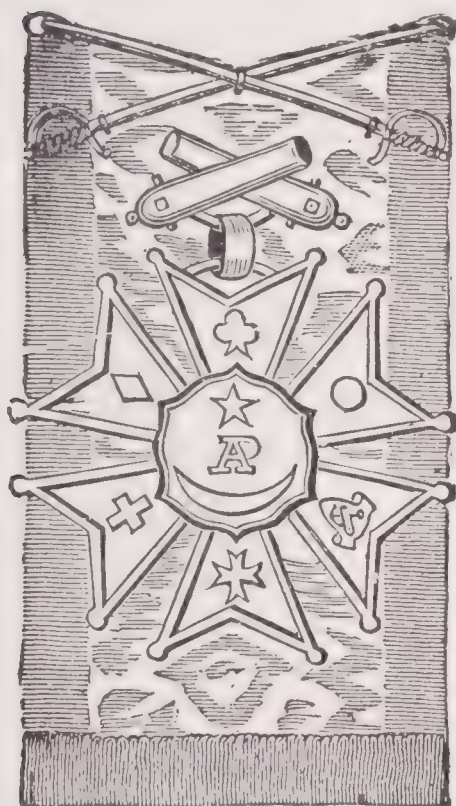
Potocki, an ancient Polish family, taking its name from the castle of Potok, and still holding possessions in Galicia and the Ukraine. Among its most distinguished members was Count Ignatius, Grand Marshal of Lithuania before the downfall of Poland, and a fellow-patriot of Kosciusko, born in 1751. In 1791 he took refuge in Saxony, and published a political tract on the establishment and fall of the constitution,—returning, however, to share in the last struggle for independence. He then passed some time in the prisons of St. Petersburg and Warsaw, and died in Vienna in 1809.

Potomac, a river of the United States, formed by two branches which rise in the Allegheny Mountains in West Virginia, and unite 15 miles S. E. of Cumberland, Md., from which point the river flows in a generally S. E. course 400 miles, and falls into Chesapeake Bay, after forming an estuary nearly 100 miles long, and from 2½ to 7 miles wide. The largest ships can ascend to Washington. A few miles above Washington the river forms a cataract 35 feet high; and between there and Westport it falls more than 1,000 feet. The scenery

in this portion of its course is wild and beautiful, especially where it breaks through the Blue Ridge at Harper's Ferry. Its principal affluents are the Shenandoah, Cacapon, and Monocacy. The Potomac forms the greater part of the boundary between Virginia and Maryland.

Potomac, Army of the, a division of the United States army during the Civil War, which operated in the E. section of the country. It was organized by Gen. George B. McClellan in 1861, and served under him in the Peninsular campaign and later in that of Antietam. General Burnside took command in 1862, and General Hooker in 1863. General Meade was in command when the victory at Gettysburg was won, in July, 1863, and continued in charge during General Grant's operations in 1864-1865.

Potomac, Society of the Army of the, a military organization founded in New York, July 5, 1869, and has held annual reunions since that



ARMY OF THE POTOMAC
BADGE.

date. All officers and soldiers who served in the Army of the Potomac and in the 10th and 18th Army Corps, Army of the James, are eligible to membership. The officers are a president, one vice-president from each army corps, the 1st, 2d, 3d, 4th, 5th, 6th, 9th, 11th, 12th, 18th, 19th Artillery Corps, Cavalry Corps, and Signal Corps, and from the general staff; a treasurer, recording secretary, and corresponding secretary.

Potosi, a city and capital of a department of the same name, in Bolivia; and one of the most famous mining towns of South America; in a barren district, nearly 50 miles S. W. of Chuquisaca. It is built on the side of the Cerro de Potosí (15,381 feet), at an elevation of 13,000 feet above the sea, and is thus one of the loftiest inhabited places on the globe. The town has a circumference of some 4 miles; but fully one-half is composed of tottering and ruined buildings, uninhabited and desolate, and the whole place, with its squalor, dilapidation, and dirt, presents a sinister aspect. The public buildings include a handsome cathedral and a mint which employs 200 hands; and the reservoirs are also worthy of mention. The streets are steep and nar-

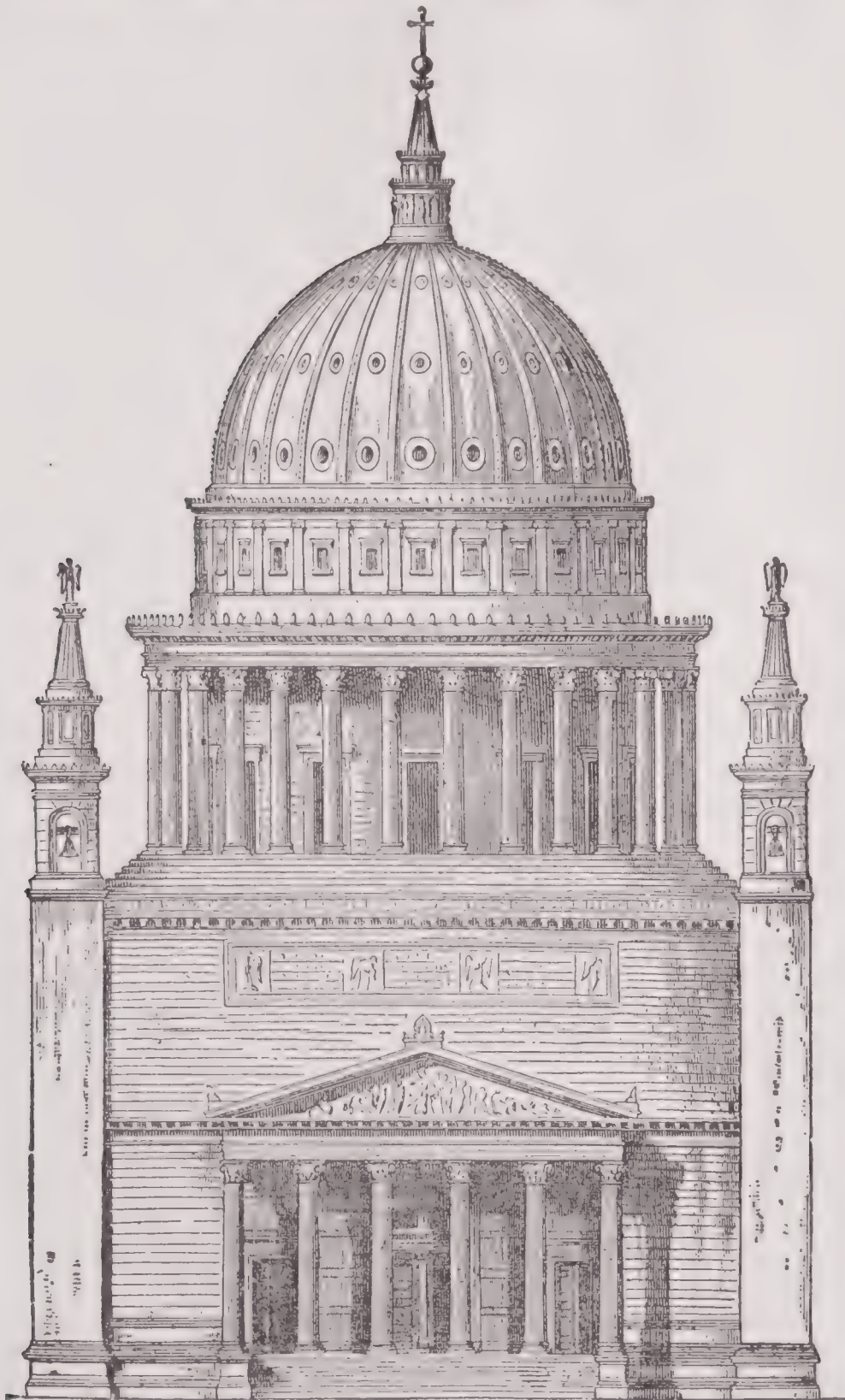
row, and there are no wagons or carriages, but only llamas and mules. The climate is very trying; all the four seasons may be experienced in one day, but usually it is bitterly cold, owing to the elevation and to the mountains all round, from which the snow scarcely ever melts. Yet Potosi is one of the principal commercial towns of Bolivia. England and French manufactures are imported; and, as the country in the vicinity produces little or nothing, all supplies have to be brought from a distance. The industry of the place is limited to silver mining. The Cerro is still rich in this ore, though the production, owing to the exhaustion of the mines near the summit, and the frequent inrush of water in those worked at a lower level, has greatly fallen off. Potosí was founded in 1545, and in 1611 had 160,000 inhabitants. Its population in 1900 was 20,910.

Pot Pourri, a dish of various kinds of meat and vegetables cooked together. Also: 1. A mixture of rose leaves and various spices, kept in jars or other vessels as a scent. 2. A vase or bouquet of flowers used to perfume a room. 3. In music, a medley; a collection of various tunes linked together; a capriccio or fantasia on popular melodies. 4. A literary composition made up of several parts put together without any unity of plot or plan.

Potsdam, chief town of the Prussian province of Brandenburg, and second residence town of the royal family of Prussia; on an island beside the lake-like river Havel, 18 miles S. W. of Berlin. It is a handsome city, with broad streets, public gardens, adorned with statues of Prussian soldiers and fine squares. The royal palace (1667-1701), in the park of which are statues of Frederick-William I., Alexander I. of Russia, and Generals Blücher, Gneisenau, Kleist, and Tauenzien; the town house, a copy of that at Amsterdam; and the military orphanage are the finest of the public buildings. The garrison church, with a steeple 290 feet high, contains the tombs of Frederick-William I. and Frederick II.; and the Friedenskirche the tombs of Frederick-William IV. and the Emperor Frederick III. The Brandenburg Gate is a copy of Trajan's Arch at Rome. In the immediate neighborhood of the town are more than half a dozen royal palaces, as Sans-Souci (1745-1747), the favorite residence of Frederick the Great, surrounded by a splendid park and gardens, containing Rauch's monument to Queen Louisa and other structures; the palace of Friedrichskron, formerly the New Palace (1763-1770), with nearly 200 rooms, many of which contain costly works of art; Charlottenhof, built by Frederick-William IV. in 1826; the Marble Palace, the summer residence of the Emperor William II.; and Babelsberg,

Potsdam

the private property of the same prince. Potsdam has an observatory, and a cadet and other military schools. Its manufactories produce, sugar, chemicals, harness, silk, waxcloth, beer, etc. Flower gardening, especially of violets, is a busy industry. Alexander von Humboldt was native. Potsdam owes its creation as a town to the



POTSDAM: CHURCH OF ST. NICHOLAS.

Great Elector, Frederick William, and to Frederick II. Prior to that period it was a fishing village, built on the site of an ancient Slav settlement. Pop. 61,414.

Potsdam Sandstone, an American sandstone of Cambrian age, containing trilobites, *Lingula antiqua*, etc.

Pot Stone, the name given in Norfolk, England, to certain large flints with a

nucleus of chalk, found in the Upper Chalk. They are considered to be ventriculites. Also, an impure variety of soapstone or compact talc, formerly used for making utensils of various kinds.

Pott, August Friedrich, a German philologist; born in Nettelrede, Germany, Nov. 14, 1802. He studied at Göttingen, became a teacher in the gymnasium at Cella, and subsequently privat-docent in the University of Berlin (in 1830). In 1833 he was appointed extraordinary Professor of Linguistic Science at Halle, and ordinary professor in 1839. Pott's greatest work is his "Etymological Researches" (second and enlarged edition 1859); another important work was his "The Gypsies in Europe and Asia." He died in Halle, Prussia, July 5, 1887.

Pottawattamies, a tribe of American Indians, belonging to the Algonquin stock. The early French settlers established a mission among them at Green Bay, and to this day many of them are Roman Catholics. They sided with the English during the Revolutionary War and in the War of 1812, and afterward settled in Kansas. They now number about 1,200.

Potter, Henry Codman, an American clergyman; born in Schenectady, N. Y., May 25, 1835. Educated in theology in Virginia, he became rector of Grace Church, New York city, in 1868; and was consecrated Protestant Episcopal bishop of New York in 1887. His works include: "Gates of the East: A Winter in Egypt and Syria" (1876); "Sermons of the City"; "Waymarks"; etc. He died July 21, 1908.

Potter, Paul, a Dutch painter; born in Enkhuysen, Netherlands, Nov. 20, 1625; settled at The Hague, and painted cattle and landscapes, but was particularly successful in the former. His coloring is uncommonly brilliant, and for fidelity to nature he is unexcelled; his pictures are consequently held in the highest estimation. One of his most celebrated pictures is the "Bull," at

Potter

The Hague. He died in Amsterdam, Jan. 27, 1654.

Potter, Paul M., an American dramatist; born in Brighton, England, June 3, 1852; entered journalism and was foreign editor of the New York "Press" in 1876-1883. Subsequently he turned his attention to the drama, and in 1889 composed his first play. His best known works are "Our Country Cousins" (1893), a dramatization of "Trilby" (1895); and "Under Two Flags" (1901). He was the American representative at the Congress of Dramatic Art at the Paris Exposition in 1900.

Potter, Mrs. See HIGGINSON, M. T.

Pottery, the art of forming vessels or utensils of any sort in clay. This art is of high antiquity, being practised among various races in prehistoric times. We find mention of earthenware in the Mosaic writings. The Greeks had important potteries at Samos, Athens, and Corinth, and attained great perfection as regards form and ornamentation. Demaratus, a Greek, the father of Tarquinius Priscus, King of Rome, is said to have instructed the Etruscans and Romans in this art. Glazed earthenware was long supposed to be of no older date than the 9th century of our era, and to have originated with the Arabs in Spain; but the discovery of glazed ware in Egypt, of glazed bricks in the ruins of Babylon, of enamelled tiles and glazed coffins of earthenware in other ancient cities, proves that this is not the case. The Arabs, however, seem to be entitled to the credit of having introduced the manufacture of glazed ware into modern Europe. The Italians are said first to have become acquainted with this kind of ware as it was manufactured in the Island of Majorca, and hence they gave it the name of *majolica*. They set up their first manufactory at Faenza in the 15th century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faience*. About the middle of the 16th century the manufactory of Bernard Palissy at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished. A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name. The principal improver of the potter's art in Great Britain was Josiah Wedgwood in the 18th century. Porcelain or chinaware first became known in Europe about the end of the 16th century through the Dutch, who brought it from the East.

Though the various kinds of pottery and porcelain differ from each other in the details of their manufacture, yet there are

Pottery

certain general principles and processes which are common to them all. The first operations are connected with the preparation of the potter's paste, which consists of two different ingredients, an earthy substance, which is the clay proper; and a siliceous substance, which is necessary to increase the firmness of the ware, and render it less liable to shrink and crack on exposure to heat. The clay is first finely comminuted, and reduced to the consistency of cream, when it is run off through a set of wire, gauze, or silk sieves into cisterns, where it is diluted with water to a standard density. The other ingredient of the potter's material is usually ground flints, or flint powder, as it is called. The flint nodules are reduced to powder by being heated and then thrown into water to make them brittle. They are then passed through a stamping mill and ground to fine powder; which, treated in much the same way as the clay, is finally passed as a creamy liquor into a separate cistern. These liquors are now mixed in such measure that the dry flint powder bears to the clay the proportion of one-sixth or one-fifth, or even more, according to the quality of the clay and the practice of the manufacturer. The mixture is then forced into presses, lined with cloth, by means of a force pump, the cloth retaining the clay and allowing the water to escape. The clay now forms a uniform inelastic mass, which is cut into cubical lumps and transferred to a damp cellar, where it remains till a process of fermentation or disintegration renders it finer in grain and not so apt to crack in the baking. But even after this process the ingredients composing the paste are not intimately enough incorporated together nor sufficiently fine in texture till another operation has been undergone, called "slapping" or "wedging," which consists in repeatedly breaking the lumps across and striking them together again in another direction, dashing them on a board, etc. This final process of incorporation is now most frequently performed by machinery.

In making earthenware vessels, if they are of a circular form, the first operation after the paste has been made is turning, or what is technically called "throwing" them on the wheel. This is an apparatus resembling an ordinary turning lathe, except that the surface of the "chuck," or support for the clay, is horizontal instead of vertical. The chuck is in fact a revolving circular table, in the center of which a piece of clay is placed, which the potter begins to shape with his hands. The rotary motion of the table gives the clay a cylindrical form in the hands of the potter, who gradually works it up to the intended shape. It is then detached from the revolving table and dried, after which, if intended for finely-

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finished ware, it is taken to a lathe and polished. It is at this stage that the handles and other prominent parts are fitted on, which is done by means of a thin paste of clay called "slip." The articles are now removed to a room in which they are dried more thoroughly at a high temperature. When they have reached what is called the "green" state they are again taken to a lathe and more truly shaped, as well as smoothed and burnished. When the articles are not of a circular form, and accordingly cannot be produced by means of the wheel, they are either pressed or cast in molds of plaster of Paris. In the former case the paste used is of the same consistence as that employed on the wheel; in the latter molds of the same sort are used, but the clay mixture is poured into them in the condition of slip. By the absorption of the water in the parts next the dry mold a crust is formed of greater or less thickness, according to the time that the liquid is allowed to remain. The molds are in two or more pieces, so as to be easily detached from the molded article.

When shaped and dried the articles are ready for the kiln, in which they are exposed to a high temperature till they acquire a sufficient degree of hardness for use. The paste of which the earthenware is composed is thus converted into what is called "bisque" or "biscuit." While undergoing this process of baking the articles are inclosed in larger vessels of baked fire-clay, called "saggers," to protect them from the fire and smoke, and to distribute the heat more uniformly. The whole firing lasts from 40 to 42 hours. After the kilns have been allowed to cool very slowly, the articles are taken out, and if they are not to be decorated in color, and sometimes also when they are to be so decorated, they are immersed in a vitrifiable composition called "glaze," which, after the vessels have been a second time subjected to heat in glazed saggers, is converted into a coating of glass, rendering the vessels impermeable to water.

These processes are all that are necessary to complete a plain earthenware vessel, but very frequently the vessels are adorned with printed or painted decorations executed in colors, such as may be burned into the substance of the article. There are two methods of printing on earthenware: press printing, which is done on the bisque, and bat printing, done on the glaze. In both cases an engraving is first executed in copper, and thence transferred, by means of a sheet of paper containing an impression, to the article requiring to be printed; but the processes are slightly different in detail. When the vessel has received its impression it is ready to be fired in the enamel kiln. Painting on earthenware is effected with a brush over the glaze.

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All the numerous varieties of earthenware are made in the manner just described, with only slight modifications in the nature of the ingredients of their composition or the processes of manufacture. Stoneware may be formed of the clays which are used for other vessels, with the addition of different sorts of sand, and sometimes of cement. A greater degree of heat is applied than in the case of ordinary earthenware, and when some fluxing substance is added it has the effect of producing that state of semi-fusion which is the distinguishing quality of stoneware. A kind of semi-vitrified ware, first made by Wedgwood, takes its name from him. It is made of two different kinds of pastes, both very plastic. This ware is incapable of taking on a superficial glaze; but by a process called "smearing," which is simply baking at a high heat in saggers coated internally with a glaze, acquires a remarkable luster.

Porcelain or chinaware is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths capable of communicating to them a certain degree of translucency by means of their vitrification. Porcelain is of two kinds, hard and tender. Both consist, like other earthenwares, of two parts—a paste which forms the biscuit, and a glaze. The biscuit of hard porcelain is composed of kaolin or china clay, and of decomposed felspar. The glaze consists of a felspar rock reduced to a fine powder, and mixed with water, so as to form a milky liquid into which the articles are dipped after a preliminary baking. Tender porcelain biscuit is made of a vitreous grit, composed of siliceous sand or ground flints, with other ingredients added, all baked together in a furnace till half-fused, and then reduced to a condition of powder. The glaze of tender porcelain is a specially prepared glass ground fine, and made into a liquid by mixing with water. The processes employed in manufacturing porcelain wares are very much the same as those used for other kinds of earthenware, but requiring more delicacy and care. The biscuit paste even of hard porcelain has so little tenacity compared with that of earthenware that it cannot easily be shaped on the wheel, and is consequently more frequently molded. The paste of tender porcelain is still less tenacious, so that the wheel cannot be used for it at all, and a little mucilage of gum or black soap must be added before it can be worked even in molds. During the baking, too, it becomes so soft that every part of an article must be supported. Tender porcelain receives two coats of glaze.

Metallic oxides incorporated with some fusible flux, such as borax, flint, etc., are used for painting on porcelain. The colors are mixed with essential oils and turpen-

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tine, and applied by means of a camel's-hair brush. When the painting is finished the vessels are baked in a peculiar kind of ovens called "muffles," which are also used for fixing the printed figures on the glaze of stoneware. By the operation of the furnace most of the colors employed in painting porcelain become quite different, and the change which takes place in them is usually through a series of tints, so that the proper tint will not be obtained unless the baking is stopped precisely at the proper time. Sometimes porcelain has designs etched on it by means of fluoric acid. Sculptures also are executed by casting in molds in various kinds of porcelain, called statuary porcelain, Parian, Carrara, etc.

The most celebrated ware of different times and countries are distinguished by distinctive names; as, Majolica-ware, Sèvres, Chelsea, Palissy, etc.; and of these, the latter—the work of Bernard de Palissy, who lived in the 16th century—deserves some special attention. Palissy, having resolved to discover a method of enamelling stoneware, succeeded, after 16 years' efforts, and proceeded to manufacture pottery characterized by a peculiar style and many singular qualities. It is not decorated with flat painting, but with figures and ornaments, which are generally pure in form, and are all executed in relief and colored. The most remarkable of the works of Palissy are his "Pieces rustiques," a designation given by him to dishes ornamented with fishes, snakes, frogs, crayfish, lizards, shells, and plants, admirably true to nature in form and color. Palissy ware may be distinguished from imitations by the fact that Palissy molded only the fossil shells, reptiles, and plants of Paris, while his imitators introduced recent shells and other objects of natural history.

The total value of all pottery products in the United States in 1908 was \$25,135,555, the lowest value since 1902, the highest being in 1906, \$31,440,884.

Pottinger (põt'in-jur), **Eldred**, an English military officer; famed for his defense of Herat in 1838; born in Ireland in 1811, went to Bombay at the age of 17 as artillery cadet. In 1837 he traversed Afghanistan in disguise, and reached Herat after many risks. The city was then held by an Afghan prince, and was besieged by the Persians for nearly a year, when it was relieved by a British diversion in the Persian Gulf. The credit of the defense was given to Pottinger. He also took a leading part in the disastrous Afghan war of 1841-1842, and as a political agent had to sign terms with the rebels which were afterward repudiated by Lord Ellenborough. A trial by court-martial only served to

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show his conduct in brighter colors. He died, in Hong Kong, in 1843.

Pottinger, Sir Henry, a British diplomatist, uncle of the preceding; born in County Down, Ireland, in 1789. He went to India as a cadet in 1804, and soon became known for his energy and administrative ability. Rising gradually to the rank of Major-General, he was after the Afghan campaign in 1839, raised to the baronetage as a reward for his services. In 1841 he went as minister plenipotentiary to China, and contributed much to bring hostilities to a conclusion. He was successively governor and Commander-in-Chief of Hong Kong (1843), governor of the Cape of Good Hope (1846), governor and Commander-in-Chief of Madras (1850-1854). He died in Valletta, Malta, March 18, 1854.

Potts, William, an American author; born in Philadelphia, Pa., May 5, 1838. For many years he was secretary and vice-president of the National Civil Service League. He was chief examiner of the Civil Service Commission of New York State in 1887. He published a volume of nature studies, "From a New England Hillside," and a Sunday-school service book, "Noblesse Oblige," etc.; also numerous pamphlets. He died July 29, 1908.

Pottstown, a borough in Montgomery co., Pa.; on the Schuylkill river, the Schuylkill canal, and the Pennsylvania, and the Philadelphia and Reading railroads; 40 miles N. W. of Philadelphia. It is the trade center of a large agricultural region. Here are a high school, public hospital, Hill School, street railroad and electric light plants, National bank and daily and weekly newspapers. The borough has rolling mills, furnaces, foundries, railroad repair shops, and manufactories of iron castings, steel wheels, metallic axles, carriages, nails, boilers, agricultural implements, cigars, etc., and an assessed property valuation of about \$5,500,000. Pop. (1890) 13,285; (1900) 13,696; (1910) 15,599.

Pottsville, a borough and county-seat of Schuylkill co., Pa.; on the Schuylkill river, and on the Philadelphia and Reading, the People's, the Pennsylvania, and the Lehigh Valley railroads; 93 miles N. W. of Philadelphia. Here are the court house and county jail, high school, Pottsville Athenæum, public hospital, street railroads, electric lights, waterworks, National and State banks, and several daily and weekly newspapers. The industries include important anthracite coal mines, large steel works, planing mills, a silk mill, and the shops of the Philadelphia and Reading Coal and Iron Company. There is an assessed property valuation of over \$6,000,000. Pop. (1900) 15,710; (1910) 20,236.

Potvin

Potvin, Charles, a Belgian poet; born in Mons, Belgium, Dec. 2, 1818. He wrote several volumes of lyric poetry: "Poems and Amours" (1838); "Poems, Historical and Romantic" (2 vols. 1840); "Political and Elegiac Poems" (1849); "Satires" (1852); "The Beggar-Woman" (1856). On the drama he wrote: "The Theater in Belgium" 1862); "Essays on Dramatic Literature" (2 vols. 1880); and some comedies, as "Choice of an Occupation" and "War". He also wrote many volumes of literary history and criticism, among them "Our Early Literary Periods" (1870) and "French Literature in Belgium before 1830."

Pot Walloper, a name given to parliamentary voters in certain English boroughs, previous to the Reform Act of 1832, in which all male inhabitants, whether householders or lodgers, who had resided in the borough and had boiled their own pot, *i. e.*, procured their own subsistence for six months, and had not been chargeable to any parish as paupers for 12 months, were entitled to a vote.

Pouched Mouse, *Dipodomys*, a genus of small, lean, long-tailed, agile rodents, with cheek-pouches. The best known species is *D. philippii*, from the waste regions of California, where it seems to find a sparse diet of seeds and roots, and in the dry season no drink but dew.

Pouched Rat, *Pseudostoma* or *Geomys*, a genus of plump, short-tailed, hamster-like rodents, with cheek pouches which open externally and are used as receptacles for food. One of the best-known species is *P. of G. bursarius*, sometimes called "gopher." Like the other species it is a native of North America, and inhabits the territory E. of the Rocky Mountains and W. of the Mississippi. It is a burrower like the mole, active in warm weather, hibernating in the cold, sluggish above ground, but very active in its subterranean progress. The cheek pouches are very large, and are crammed with roots, seeds, etc., but not with earth as the Indians used to maintain. Being voracious gnawers, the pouched rats do much damage to the roots of trees and crops.

Poughkeepsie, a city and county-seat of Dutchess co., N. Y.; on the Hudson river, and the West Shore, the Poughkeepsie and Eastern, the Philadelphia, Reading, and New England, and the New York Central and Hudson River railroads; 75 miles N. of New York. It has daily steamboat connection with New York and Albany. The Hudson is here crossed by a celebrated cantilever bridge which was completed in 1889 at a cost of nearly \$5,000,000. It is 7,100 feet long, has three cantilevers, and

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rests on six massive piers. Poughkeepsie is the seat of VASSAR COLLEGE (*q. v.*). Here are Lyndon Hall School for Girls, Berkely School for Boys, Riverview Military Academy, Eastman's Business College, public library, orphan asylum, Home for Old Men, Home for Old Women, General Hospital, Hudson River Hospital for the Insane, court house, Home for the Friendless, National and private banks, electric lights and street railroads, and daily and weekly periodicals. Poughkeepsie has manufactories of iron, machinery, malt liquors, boots and shoes, leather, carpets, glass, shirts, silk goods, clothing, flour, earthenware, drugs, etc., and an assessed property valuation of nearly \$14,000,000. The city was settled by the Dutch in 1690; during the Revolution it was the capital of New York; and the State convention to ratify the National Constitution met here in 1788. Pop. (1900) 24,029; (1910) 27,936.

Pougin, François-Auguste Arthur, a French author; born in Chateauroux, France, Aug. 6, 1834. Besides pseudonymous contributions to various journals, he published among others the following: "French Musicians of the 18th Century" (1363); "Meyerbeer: A Biographical Sketch" (1864); "William Vincent Wallace" (1865); "F. Halvéy, Writer" (1865); "Bellini, his Life and Works" (1867); "Rossini" (1869); "Musical Literature in France" (1869); "Albert Gribou" (1870); "Rossini" (1871); "Verdi" (1881), etc.

Poujoulat, Jean Joseph François, a French historian; born in La Fare, Bouches-du-Rhône, Jan. 26, 1800. His principal works are: "History of Jerusalem" (1840-1842); "Cardinal Maury" (1855); "History of the French Revolution" (1855); "History of France from 1814" (1865-1867); "Insanities of the Present Time regarding Religion" (1877); "The Bedawin Woman" (2 vols. 1835), a novel, crowned by the academy. He died in Paris, Jan. 5, 1880.

Poulkova. See PULKOWA.

Poulpe, a genus of *Cephalopoda*, of the order *Dibranchiata*, having eight feet or arms, nearly equal, united at the base by a membrane, and very long in proportion to the body. There is no shell or internal "pen." The arms are used for swimming in water, creeping on land, and seizing prey. Poulpes swim by contractions of the muscular web of the body, which extends upon the arms. They creep on shore in a spider-like manner, with sprawling arms. Like other cephalopods, when alarmed or annoyed, they discharge an inky fluid.

Poultice, a soft composition, as of bread, meal, bran, or a mucilaginous substance, to

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be applied to sores, inflamed parts of the body, or the like; a cataplasm. Poultices are of several kinds; the most important are (1) *Cataplasm fermenti* (yeast poultice), formed of yeast, flour, and water heated to 100° F. It is used as a stimulant and antiseptic in cases of indolent ulcers. (2) *Cataplasm lini* (linseed poultice) formed by mixing four ounces of linseed meal with half a fluid ounce of olive oil, and then gradually adding 10 fluid ounces of boiling water. It is applied to inflamed and suppurating parts. *Cataplasm sinapis* (mustard poultice) made by mixing 2½ ounces of linseed meal with 2½ ounces of powdered mustard, and then adding to them gradually 10 fluid ounces of boiling water. It acts as a powerful rubefacient and vesicant, it relieves slight inflammations of serous and mucous surfaces when applied to a neighboring part, as on the chest in bronchitis and pleurisy; and also relieves congestion of various organs, by drawing the blood to the surface.

Poultry, a general name for all birds bred for the table, or kept for their eggs. The birds most commonly included under this designation are the common fowl, the peafowl, the guinea fowl, the turkey, goose, and duck. There is this great difference between the varieties of the domestic fowl, that some are disposed by constitution to continue laying throughout the whole season without sitting; while others after having laid from 12 to 15 eggs sit obstinately, and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Hamburg, Cochin, Brahma, Scots Gray, Polish, Spanish, Leghorn, Plymouth Rock, Houdan, Minorca, etc. Poultry, if they are to be kept for profit, should have a spacious house should be moderately warm, well lighted, and perfectly dry. Either boxes must be formed along the walls to serve as nests for the fowls, or shelves on which baskets for the nests may be put. These boxes and shelves may be formed of wood; but they are better when constructed of smoothly polished flagstones or slates. Turkeys and geese should not occupy at night the same house with hens and ducks, as they are apt to be mischievous, especially to sitting birds. A small pond is sufficient for the thrifty rearing of both geese and ducks. Gray African geese are by many raisers considered the most profitable of all geese to keep. They grow the heaviest in the shortest space of time, and are ready for market in 10 weeks, weighing at that age between 8 and 10 pounds. They are very much like the Peking duck in this respect, and as compared with other geese give the most satisfactory returns for the least labor and time spent in growing them. They are, according to standard

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weights, as heavy as the Toulouse and Embden, but specimens are not uncommon that exceed these weights by several pounds. They are first class layers, and average about 40 eggs in a season. This is considered a low estimate for their egg production. For table purposes they are esteemed very highly, their flesh being fine and of good flavor. In many cases fowls are bred for exhibition and to take prizes, this and the consequent value of the eggs being often a considerable source of profit. Hatching by artificial means has long been practised in Egypt, and artificial incubators are now well known in the United States and other countries.

Pounce, a fine powder, such as pounded gums and arach and cuttlefish bones used to dry up the ink on a fresh written manuscript; now superseded in the United States by blotting paper, except in the case of parchment. The word is also applied to charcoal dust inclosed in some open stuff, as muslin, etc., to be passed over holes pricked in the work, to mark the lines or designs of a paper underneath. It is used by embroiderers to transfer patterns upon their stuffs; also by fresco painters, sometimes by engravers, and in varnishing.

Pound, a unit of weight. Pounds are of different kinds, as pounds Troy (containing 12 ounces), pounds avoirdupois (containing 16 ounces), etc. A cubic inch of distilled water, at 62° F., the barometer being 30 inches, weighs 252.458 Troy grains, and the Troy pound is equal to 5,760 of these grains. The avoirdupois pound is equal to 7,000 Troy grains, so that the Troy pound is to the avoirdupois as 144 to 175. Pound is also the principal English coin of account, and corresponding to the "coin of circulation" called a sovereign, of the value of about \$4.80. It is divided into 20 shillings or 240 pence, and weighs 123.27447 Troy grains (7.98805 grammes), as determined by the British Mint regulation, in virtue of which a mass of gold weighing 40 pounds Troy is coined into 1,869 sovereigns. The name is derived from the fact that in the time of the Conqueror, one Tower pound of silver was coined into 240 silver pence; whence the Tower penny-weight was really and truly the weight of a penny. The word is also applied to an inclosure, erected by authority, in which cattle or other beasts found straying are impounded or confined.

Poundal, a name sometimes used for the absolute foot pound second unit of force, which will produce in one pound a velocity of one foot per second, after acting for one second.

Poushkin, or **Pushkin** (pösh'kin), **Alexander**, a Russian poet; born in Moscow,

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Russia, June 6, 1799. In 1817 he received a government appointment, but was banished for writing an "Ode to Liberty"; was recalled and restored to office in 1825. A portion of his works have been translated into German, French and English. He wrote "Ruslan and Lindmilla"; "Fountain of Bakhtchisarai," "Robber Brothers"; "Count Nuhm"; "Poltava"; "The House in Kolomna"; "Boris Godunoff"; "Eugene Onyegin." Among his novels are: "The Captain's Daughter"; and "The Queen of Spades." He died in St. Petersburg, Feb. 10, 1837.

Poussin, Gaspar, a French painter, whose proper name was DUCHET; born in Rome, May, 1613. His sister married Nicolas Poussin, which circumstance led him to study painting under that great master, whose name he adopted. He particularly excelled in landscapes. His works are composed in general from studies in the campagna of Rome and surrounding country, worked out with the feeling of a mind deeply imbued with classical associations, and tending toward melancholy reflection, by contrasting the glory of the past with the decadence of the present—ideas entirely the opposite of those of Claude, who, trusting to the never-fading beauty of nature, endeavored, from the scenery and architectural remains in Italy, to realize the classic age in all its glory. He died in Rome, May 25, 1675.

Poussin, Nicolas, a French painter; born in Andelys, Normandy, June, 1594. Having practised the art under different masters at Paris, he went to Rome, and studied the works of Raphael, Domenichino, and Titian, with great attention; but his taste for the antique prevailed, and is observable in all his works. Louis XIII. invited him to France in 1640, and gave him a pension, with apartments in the Louvre; but Poussin was so annoyed by the envy and intrigue of contemporary artists, that he returned to Rome, and remained there during the rest of his life. He died in Rome, Nov. 19, 1665.

Pouter, a variety of fancy pigeon, the chief character of which is its very projecting breast.

Pouvillon, Emile, a French novelist; born in Montauban, France, in 1840. His novel "Césotte" (1880), a tale of village life, won the Academy's Lambert prize. It was followed by "Jennie's John" (1886); "The Blue Horse" (1888); "Singing-Weeping"; and "Bernadotte," a cabinet drama,—an antithesis of Zola's "Lourdes."

Powan (*Coregonus clupeoides*), a fish inhabiting Loch Lomond, in Scotland, and also known as the fresh-water herring.

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Powder. See GUNPOWDER.

Powderly, Terrence Vincent, an American lawyer; born in Carbondale, Pa., Jan. 22, 1849; received a public school education; settled in Scranton, Pa., in 1869, where he worked as a machinist till 1877. In the following year he was elected mayor of the city on the Labor ticket, and was reelected in 1880 and 1882. He was General Master-Workman of the Knights of Labor in 1879-1893; then he studied law; and was admitted to the bar in 1894. In 1906 he was appointed to special work in the United States Bureau of Immigration. Author of "Thirty Years of Labor"; "History of Labor Day"; and numerous articles on economic subjects.

Powell, Baden, an English physicist; born in London, Aug. 22, 1796; educated at Oriel College, Oxford; in 1821 became vicar of Plumstead, and in 1824 was made F. R. S. From 1827 till his death, he was Savilian Professor of Geometry at Oxford. He published a history of natural philosophy (1834), treatises on the calculus (1830), optics (1883), and the undulatory theory of light (1841); but he is best known by his contribution on the evidences of Christianity to the "Essays and Reviews" and by other theological works, regarded at the time as dangerously "liberal" in tendency. These include "Essays on the Plurality of Worlds" (1856); "Christianity without Judaism" (1857); "Natural and Divine Truth" (1857); and "The Order of Nature" (1859). He died in London, June 11, 1860.

Powell, John Wesley, an American geologist; born in Mount Morris, N. Y., March 24, 1834. He was educated at Oberlin College; was a lieutenant-colonel of artillery at the close of the Civil War; Professor of Geology in the Illinois Wesleyan University, 1865; explored the cañon of the Colorado river in 1867 and in 1870-1874. He was director of the United States Geological Survey in 1879-1896, and of the United States Bureau of Ethnology after 1879. The special volumes of reports written by Major Powell are: "Exploration of the Colorado River in 1869-1872" (1875); "Geology of the Uinta Mountains" (1876); "The Arid Regions of the United States" (1879); "Introduction to Study of Indian Languages" (1880); "Cañons of the Colorado," etc. He died Sept. 23, 1902.

Powell, Thomas, an American author; born in London, England, Sept. 3, 1809. For many years he was connected with the Frank Leslie publications. Besides two acted plays, "True at Last" and "The Shepherd's Well," he published: "Florentine Tales" (1847); "Living Authors of England" (1849); "Living Authors of

"America" (1850). He died in Newark, N. J., Jan. 13, 1887.

Powelson, Wilfred van Nest, an American naval officer; born in Middletown, N. Y., Sept. 15, 1872; was graduated at the United States Naval Academy in 1893; was selected by the government to pursue a special course in naval architecture at the University of Glasgow, served two years on the flagship "New York", and later on the "Fern." After the destruction of the "Maine" in Havana harbor he was appointed to investigate the disaster. His report showing that the "Maine" was sunk by an exploded mine was published and favorably commented on by many scientific periodicals. He commanded the gun on the "St. Paul" which sunk the "Terror", a Spanish torpedo boat, near San Juan, Porto Rico; was promoted lieutenant, March 6, 1901.

Power, the product arising from the multiplication of a quantity or number into itself. The first power of any quantity or number is the quantity or number itself; the second power is the square or product of the quantity or number multiplied by itself; the third power is the cube or product of the square of the quantity or number multiplied by the original quantity or number; this again multiplied by the original quantity or number is the fourth power. Thus the powers of a . are a (or a^1), a^2 , a^3 , a^4 , that is $a \times a$ (a^2), $a^2 \times a$ (a^3), etc. The figures 2 , 3 , 4 , etc., denoting the powers of the quantities, are called exponents or indices. Powers which have fractional and negative indices are termed fractional and negative powers respectively.

In mechanics: (1) That which produces motion or force; that which communicates motion to bodies, changes the motion of bodies, or prevents the motion of bodies; a mechanical agent or power. (2) The moving force applied to overcome some force or resistance, to raise a weight, or produce other required effect; air, water, steam and animal strength are employed as powers. (3) The mechanical effect or advantage produced by a machine. Thus in a lever the mechanical advantage is the ratio of the weight to the moving force when in equilibrium; thus if a power of two pounds sustains a weight of 30 pounds, the mechanical advantage is 30 divided by 2 = 15. (4) Force or effect considered as resulting from the action of a machine.

In law: (1) A term employed to denote a reservation to either party in a covenant enabling him to do certain acts regarding the property conveyed. (2) An authority given by one party to another to act for him or to do certain acts, as to make leases, etc.

In optics, the magnifying or diminishing capacity of any lens or set of lenses. By ellipsis the word is used for the lens itself.

Powers, Hiram, an American sculptor; born in Woodstock, Vt., July 29, 1805. While still a boy he went to Cincinnati, O., where he became an apprentice to a clock-maker, and about the same time formed the acquaintance of a German sculptor, who taught him to model in clay. Subsequently he was employed for seven years making wax figures and fitting them with machinery for the Cincinnati museum. In 1835 he went to Washington, where he executed the busts of several distinguished persons. Two years later he was enabled to go to Italy to study his art, and he resided in Florence till his death. There he produced his statue of "Eve," which excited the admiration of Thorwaldsen, and in 1843 the still more popular "Greek Slave," of which six copies in marble, with cast copies innumerable, were produced. Of his "Fisher Boy" (1846) three copies were ordered. Among the other works the chief were "Proserpine," "Il Penseroso," "California," "America," and busts of Washington for the State of Louisiana, of Calhoun for South Carolina, and Daniel Webster for Boston, as well as those of John Q. Adams, Andrew Jackson, Marshall, Van Buren, and other distinguished Americans. He died in Florence, Italy, June 27, 1873.

Powers, Horatio Nelson, an American poet; born in Amenia, N. Y., April 30, 1826. Among his works are: "Through the Year" (1875); "Poems, Early and Late" (1876); "Ten Years of Song" (1887); "Lyrics of the Hudson." He died in Piermont, N. Y., Sept. 6, 1890.

Powers, Le Grand, an American statistician; born in Preston, N. Y., in 1847; was graduated at Iowa State University in 1872; commissioner of labor in Minnesota in 1891-1899; then became chief statistician of the 11th Census, in charge of agriculture. Among his books are "Minnesota Bureau of Labor Biennial Reports" (1890-1899); "Farmer Hayseed" (a reply to "Coin's Financial School"); etc.

Powhatan, an Indian chief; born about 1550; was the father of Pocahontas, who is celebrated in the colonial history of Virginia as the rescuer of John Smith. He died in April, 1618.

Powhatan, the name of an Indian confederacy, which at an early day lived on the E. shore of Virginia and a portion of Maryland. They at first numbered only seven tribes, but under the leadership of their chief, Powhatan, increased to 30. They were first known to the Spaniards, when the latter sought to establish a mission on the Rappahannock river. The English

found them when forming the colony at Jamestown. Constant troubles between the confederacy, the English, and the Iroquois, soon destroyed nearly all the Powhatan tribes, and after 1684 they were not recognized as a separate nation.

Poynings' Law, or the Statute of Drogheda, an act of the Irish Parliament, passed in 1494, whereby all general statutes before that time made in England were declared of force in Ireland. It was so named from Sir Edward Poynings, deputy of Ireland under Henry VII. in 1494, when he suppressed the revolt of Perkin Warbeck.

Poynter, Sir Edward John, an English painter; born in Paris, March 20, 1836; educated at Westminster School and Ipswich Grammar School; received his art training at the schools of the Royal Academy and under Gleyre in Paris; gained a reputation by his "Israel in Egypt," exhibited in 1867, and "The Catapult" (1868); painted the cartoons for the mosaic of St. George in the Westminster Palace (1869). Among his chief pictures are "Perseus and Andromeda" (1872), "More of More Hall and the Dragon" (1873), "The Golden Age" (1875), "Atalanta's Race" (1876), "Zenobia Captive" (1878), "Diadumene" (1885), "Under the Sea Wall" (1888), and "A Roman Boat Race" (1889). He was elected an Associate in 1869 and a Royal Academician in 1876, was the first Slade Professor of Art at University College, London, and was director for art at South Kensington for some years. He was also the author of "Ten Lectures on Art" (1879). He became president of the Royal Academy and was knighted in 1896.

Pozzo-di-Borgo, Charles Andreas, Count, a Russian diplomatist, a native of Corsica, distinguished as a statesman in the interest of the "Holy Alliance"; born near Ajaccio, Corsica, March 8, 1764, first became conspicuous as a partisan of the English in the time of Paoli. When Corsica was incorporated with France, he became a political employé of other governments and contributed his services—especially as a general and ambassador in the Russian service—to the overthrow of Napoleon. He was a man of great political ability and foresight. After the fall of Napoleon, from 1814 to 1830, he acted as Russian ambassador at Paris, and afterward lived about two years as ambassador in London. He died in Paris, Feb. 15, 1842.

Pozzolana, or Pozzuolana, a sort of mortar produced in Italy and formed of volcanic ashes. When mixed with a small portion of lime it quickly hardens even under water. This singular property renders it very useful as a cement in the erec-

tion of moles and other buildings in maritime situations. It is much used in Italy as a substitute for mortar, and has received its name from Pozzuoli, the port from which it is shipped.

Pozzuoli, the ancient Puteoli, a city and seaport of Southern Italy, 6 miles W. S. W. of Naples, on the shore of the bay of Baiæ (Golfo di Pozzuoli), the N. W. portion of the Bay of Naples. The coast forms a natural harbor, which is well sheltered; and a considerable trade and an active fishing is carried on. Pozzuoli is a city of great historic interest. It was founded by the Greeks about 520 B. C., and became under Rome a great center of commerce. St. Paul landed here in the course of his journey to Rome. Pozzuoli was destroyed by the Goths more than once, rebuilt by the Byzantine Greeks, and finally devastated by earthquakes and volcanic eruptions. It abounds in ancient ruins. The cathedral stands on the site of a temple of Augustus, and in one of the lateral walls six Corinthian columns of the old temple are preserved. A ruined temple of Serapis also remains, inclosed by 48 marble and granite columns. On an eminence behind the town stands the ruined amphitheater, resting on three series of arches. In the neighborhood are Lake Avernus, the Grotto of the Sibyl, the baths of Nero, the ruins of Baiæ and Cumæ, etc. Pozzuoli has been considerably altered by the establishment of Armstrong, Mitchell & Co.'s works for supplying guns, armor-plates, and machinery to the Italian government.

Practice, in arithmetic, a particular case of proportion in which the first term is unity. It depends upon the principles of fractions, and the judicious choice of aliquot parts. In law, the form, manner, and order of conducting and carrying on suits and prosecutions through their various stages, according to the principles of law and the rules laid down by the courts.

Pradier (pra-di-ã), **Jacques**, a Swiss sculptor; born in Geneva, Switzerland, May 23, 1792. Having gone to Paris in 1809, and studied art in 1813, he gained the prize of the Academy for a bas-relief of Philoctetes and Ulysses. This work procured him admission into the French Academy at Rome. From 1823 he worked constantly at Paris, where his popularity was very great and where he was admitted to the institute in 1827. His works are of various kinds; religious, monumental, but mainly classical. In execution he ranks as a sculptor of the first class, but his invention and conception are defective, and there is, according to some critics, a decided meretriciousness in his style. He died in 1844. His works comprise a "Centaur and Bacchante," a "Psyche," a "Venus," a "Phryne," the

"Three Graces," 12 colossal "Victories" on the monument of Napoleon I. in the Hôtel des Invalides, "Statue of Rousseau" at Geneva, etc. He died near Paris, June 14, 1852.

Pradon, Nicolas, a French tragic poet; born in Rouen, France, in 1632. Besides many fugitive poems, he wrote: "Tamerlane" (1677); "Phædra and Hippolytus" (1677); "The Troad" (1679); "Statira" (1683); "Regulus" (1688); "Scipio Africanus" (1697); and his most famous work, "Pyramus and Thisbe." He died in Paris, in 1698.

Pradt, Dominique Dufour de, a French statesman; born in Allanches, Auvergne, April 23, 1759. He wrote: "Historic Narrative of the Restoration of Royalty in France" (1814); "History of the Embassy to the Grand Duchy of Warsaw in 1812" (1815); "The Congress of Vienna" (2 vols. 1815-1816); "Historical Memoirs on the Spanish Revolution" (1816); "The Colonies and the Present Revolution in [Spanish] America" (1817); "The Congress of Carlsbad" (1819-1829). He died March 18, 1837.

Præcipe, a writ commanding something to be done, or demanding a reason for its non-performance. The term is now only used to denote the note of instructions delivered by a plaintiff or his attorney to the officer of the court, who stamps the writ of summons.

Praed, Mrs. Campbell Mackworth (Rose Caroline Murray-Prior), an Australian novelist, wife of the nephew of W. M. Praed; born in Bromelton, Queensland, March 27, 1852. In 1876 she went to London and began to write her noted Australian stories. Her most popular works are: "An Australian Heroine" (1880); "Moloch" (1883); "The Head Station" (1885); "December Roses" (1892); "Outlaw and Lawmaker" (1893); "Nulma" (1897). In collaboration with Justin McCarthy she has written "The Right Honorable" (1886), and "The Ladies' Gallery" (1889), novels of political and social life.

Praed, Winthrop Mackworth, an English poet; born in London, July 26, 1802. He was educated at Eton, where in 1820 he became one of the principal contributors to "The Etonian." From Eton he went to Trinity College, Cambridge, where he obtained for two years in succession the chancellor's prize for an English poem. At this time, like Macaulay, he contributed both in prose and verse to "Knight's Quarterly Magazine." In 1829 he was called to the bar, and in 1830 and 1831 was returned for St. Germans to Parliament, where he took a prominent part in opposing the passing of the Reform Bill. He sat subsequently as member for Yarmouth, and after-

ward for Aylesbury. He acted also for a short time as secretary to the board of control, and became ultimately recorder of Barnstaple and deputy high-steward for the University of Cambridge. His poems are mostly of a light and elegant character, belonging to the class known as *vers de société*, but they also comprise others in a more serious vein. He died in London, July 15, 1839.

Præfect, a common name applicable to various Roman functionaries. The most important was the *Præfectus urbi*, or warden of the city, whose office existed at an early period of Roman history, but was revived under Augustus, with new and greatly altered and extended authority, including the whole powers necessary for the maintenance of peace and order in the city, and an extensive jurisdiction civil and criminal. The *Præfectus prætorio* was the commander of the troops that guarded the emperor's person.

Præmunire, in English law, a term applied to (1) a certain writ, (2) the offense for which the writ is granted, and (3) the penalty incurred by it. The name is derived from the first two words of the writ: *præmunire* (*i. e.* *præmoneri*) *facias* A. B., that is, cause A. B. to be forewarned (to appear and answer the contempt with which he is charged) (16 Richard II., c. 5). The original offense against which the Statute of Præmunire was directed was that of asserting the jurisdiction of the Pope in England, and denying that of the king. But by subsequent statutes the penalties of præmunire have been extended to many other offenses of a miscellaneous kind.

Præsepe, in astronomy, the Beehive; a nebulous-looking object in the constellation Cancer. A small opera glass will resolve it into the constituent stars. It was known to the ancients.

Prætexta, a long white robe with a purple border, originally appropriated by Tullus Hostilius to the Roman magistrates, and some of the priests, but afterward worn by the children of the higher classes; by boys till they were the age of 17 (when they were entitled to assume the *toga virilis*), or, at least, till they were 14; by girls it was worn till marriage.

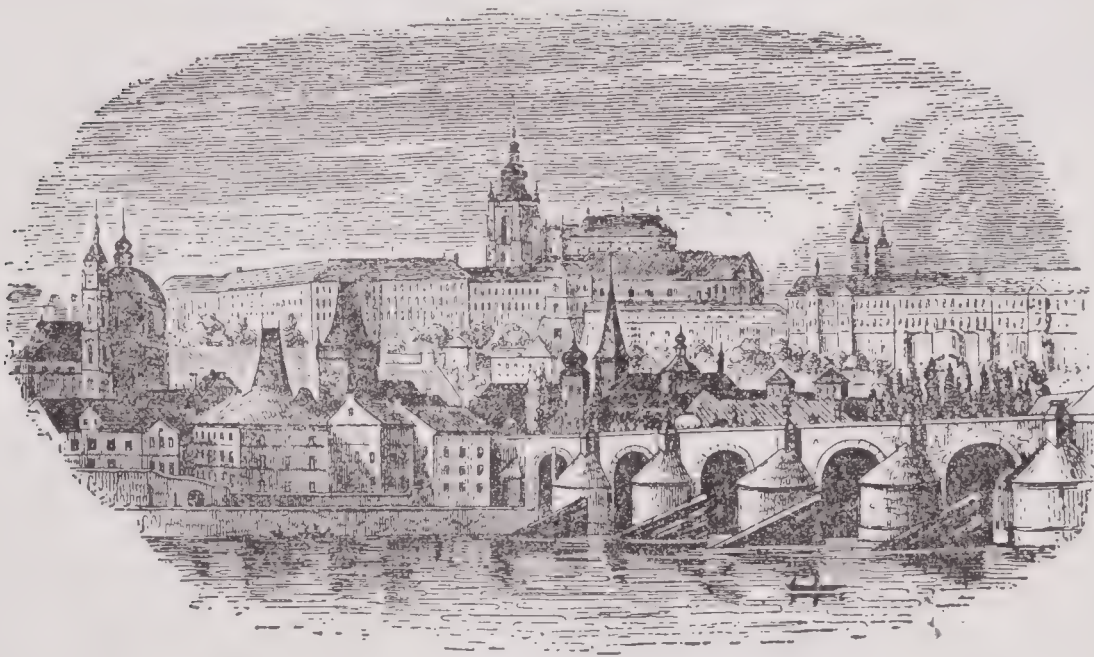
Prætor, originally the official title of the Consuls at Rome. When the patricians were compelled to acquiesce in the consulship being thrown open to the plebeians, they stipulated that a new curule magistrate should be appointed from the patricians exclusively, to act as supreme judge in the civil courts. On this magistrate the title of prætor was bestowed. In 337 B. C. the prætorship was thrown open to the plebeians. About 240 B. C., the number of aliens residing in Rome had increased to such an ex-

tent that it was found necessary to appoint a second prætor, who should decide suits between aliens or between aliens and citizens. He was known as the *prætor peregrinus*, the other prætor, *prætor urbanus*, having cognizance of suits between citizens only. In 227 B. C., the number was increased to four, the two additional prætors to act as governors of provinces. By Sulla the number was augmented to eight, by Julius Cæsar to 10, 12, and eventually to 16. The prætors held their offices for one year, and were afterward sent out by lot as governors of provinces.

Prætorian Guard, a body of permanent troops, established by Augustus as Imperial Life Guards, in imitation of the *cohors prætoriana*, or bodyguard attached to the person of the Commander-in-Chief of a Roman army. The prætorian guards were kept up by successive emperors, and, being under

daughter, Maria Teresa and her issue. Pragmatic sanctions were also published by Charles IV., ruler of the Two Sicilies, in 1759, and by Ferdinand, King of Spain, in 1830.

Prague, the capital of Bohemia, and the third largest city of Austria-Hungary; situated at the base and on the slope of the hills which skirt both sides of the isleted Moldau; 217 miles N. N. W. of Vienna and 118 S. S. E. of Dresden. It offers a highly picturesque appearance from the beauty of its site, and the numerous lofty towers (more than 70 in number) which rise above the many noble palaces, public buildings, and bridges of the city. The fortifications have been gradually demolished since 1866. The royal Burg, on the Hradschin (240 feet), the ancient residence of the Dukes of Bohemia, dates mainly now from the 16th and 17th centuries, and has 440 rooms. The



VIEW OF PRAGUE.

special organization and enjoying several privileges, they became in time so powerful that they were able to raise and depose emperors at their will. They were reorganized by Septimius Severus, and were finally suppressed by Constantine the Great.

Pragmatic Sanction, a rescript or answer of the sovereign delivered by advice of his council to some college, order, or body of people, on any case of their community. By the French the term was appropriated to certain statutes limiting the jurisdiction of the Pope, as in A. D. 1268 and 1438. Pope Leo X., in 1545, persuaded Francis I. to exchange them for a concordat. Generally it is applied to an ordinance fixing the succession to a throne in a certain line. Thus, by the Pragmatic Sanction of Germany in 1439, the succession of the empire was made hereditary in the house of Austria, and in 1724 the Emperor Charles VI., being without male issue, published another, settling the succession upon his

neighboring cathedral of St. Vitus (1344) is still unfinished, though building was resumed in 1867. Here are the splendid royal mausoleum (1589) and the shrine (1736) of St. John of Nepomuk containing $1\frac{1}{2}$ tons of silver. Of 47 other Catholic churches the chief are the domed Jesuit church of St. Nicholas, with its lavish decorations, and the Teyn church (1407), the old Hussite church, with the grave of Tycho Brahé, and its marble statues of the Slavonic martyrs, Cyril and Methodius. Of five bridges and two railway viaducts the most striking is the Karlsbrücke (1357-1503), 543 yards long, with gate-towers at either end, and statues of John of Nepomuk and other saints. It was greatly damaged by flood in September, 1800, but has since been restored. Other noteworthy objects are the town hall (1381-1884), the Pulverturm (1475), the new Czech Theater (1883), the old Jewish graveyard, the Theresa Institution for Ladies, the vast Czerni Palace (now used as barracks), the picture gallery, and the Premonstratensian monastery of Strahow. Prague has, besides, numerous public gardens and walks in the suburbs, with several royal and noble parks open to the public in the vicinity of the city. The suburb of Karolinenthal, which is traversed by the great viaduct of the railway, and is of modern growth, has some fine buildings, numerous gardens, barracks, and manufacturing establishments; and somewhat far-

ther N. is the great botanical garden, with the neighboring public walks on the Moldau. The university, founded in 1348, had 10,-

town during the war; and a century later it again fell into the hands of different victors, having been compelled in 1744 to capitulate to Frederick the Great, who here on May 6, 1757, defeated 60,000 Austrians under Prince Charles of Lorraine. Till the downfall of Napoleon the city continued to suffer more or less directly from the troubles in which the House of Austria was involved. Since then, however, it has made rapid strides, and enjoyed prosperity and quiet, except in 1848, when the meeting of the Slavonic Congress within its walls called forth such strongly marked democratic demonstrations on the part of the supporters of Pan-slavism that the Austrian government dissolved the conclave, and restored quiet by the summary method of causing the old and new town to be bombarded for two



PRAGUE: CATHEDRAL OF ST. VEIT.

000 students at the beginning of the 15th century; but subsequently it had a long period of inactivity. It received a new constitution in 1881, having now two coördinate sides or sections, one German and one Czech, with respectively 156 and 140 teachers, and 1,470 and 2,361 students. It possesses a library of 195,000 volumes and 3,800 manuscripts, a fine observatory, museums of zoology and anatomy, a botanical garden, etc. The manufactures include machinery, chemicals, leather, cotton, linen, gloves, beer, spirits, etc. Prague is the great center of the commerce of Bohemia, and the seat of an important transit trade.

History.—Prague was founded, according to popular tradition, in 722 by the Duchess Libussa, but really by German settlers about 1100. In the 14th century its munificently endowed university brought foreigners to it from every part; but in 1424 Prague was conquered and almost destroyed by the Hussites, who had made a successful stand against the Emperor Sigismund's army. In the Thirty Years' War it suffered severely, and in 1620 the battle was fought at the Weissenberg, near the city, in which the Elector-Palatine, Frederick V., was completely defeated, and compelled to renounce his assumed crown. Swedes and Imperialists successively gained possession of the



PRAGUE: WESTERN GATE.

days. In 1866 Prague was occupied bloodlessly by the Prussians, who here on Aug. 23,

Prairie

concluded a treaty with Austria. The jealousy subsisting between the Czech and the German population was strongly accentuated on the occasion of the Exhibition of 1891. Pop. (1909) 233,649.

Prairie, the name given by the early French settlers in America to extensive tracts of land, either level or rolling, destitute of trees, and covered with coarse tall grass, interspersed with numerous varieties of flowering plants.

Prairie Chicken, the popular name of the pinnated grouse of the United States (*Tetrao cupido*). The neck of the male is



PRAIRIE HEN.

furnished with neck tufts of 18 feathers, and is remarkable also for two loose, pendulous, wrinkled skins, which somewhat resemble an orange on inflation. The prairie hen is much prized for the table.

Prairie Dog, a name given to either of the two species of *Cynomys*, but especially to *C. ludovicianus*, from the fancied resem-



PRAIRIE DOG.

blance of its cry to the bark of a small dog, whence it has been also called the barking squirrel. It is about a foot long, reddish-brown above, lighter beneath. Its habits are eminently social; it forms large communities on the prairies, each burrow having a little hillock at its entrance, and excavated passages connect the burrows, which are sometimes shared by the burrowing owl. (*Athene cunicularia*).. The rattlesnake occasionally occupies a deserted burrow, and preys largely on the prairie dog.

Pratique

Prairie Hen, See PRAIRIE CHICKEN.

Prairie Region, an extensive region of North America, consisting of treeless plains, usually of a deep, fertile soil. Those E. of the Missouri river are wonderfully productive when properly tilled, as are also those W. when put under a system of IRRIGATION (*q. v.*). The cold of winter is severe, to which succeeds a short rainy season, and then, W. of the Mississippi, a rainless summer. The drought is produced by the dryness of the prevalent W. wind, which loses the moisture it brought from the Pacific by crossing the Rocky Mountains and the chain along the California coast. Prevalent vegetation *Mimoseæ* (especially *Prosopis*), *Cactaceæ*, etc. (Thomé.)

Prairie Squirrel. See GOPHER.

Prairie State, Illinois. The face of the State is mostly a level table-land, elevated from 300 to 800 feet above the sea.

Prairie Wolf, or **Coyote** (*Canis latrans*), the small wolf which is found on the prairies in North America, believed by many to be a mere variety of the European wolf. It is a cowardly animal, and only dangerous to man when in packs and pressed by hunger.

Prakrit, a derivative language. The name is applied collectively to the more modern languages of Northern and Central India which grew out of the Sanskrit, as Italian, Spanish, French, etc., did from Latin.

Prase, in mineralogy: (1) A dull leek-green chalcedony, owing its color to the presence of exceedingly fine granular chlorite. According to King, this stone is now confounded with others indiscriminately called plasma by the antiquary. (2) A green crystallized quartz found at Breitenbrunn, Saxony; the color is due to inclosed fine filaments of green asbestiform actinolite.

Prati, Giovanni, an Italian poet; born in Dascindo, near Trent, Jan. 27, 1815. He wrote "Edmenegarda" (1841), a powerful narrative poem after the Byronic manner, which was received with extraordinary favor. Then followed several volumes of lyric poetry, which still further increased the poet's reputation. His satire "Satan and the Graces" (1855), and his epics "Count Riga" (1856), "Rudolf" (1858), "Ari- bert" (1860), were equally successful. He died in Rome, May 9, 1884.

Pratique, liberty or license of converse or communication between a ship and the port at which it arrives; hence, a license or permission to hold intercourse and trade with a port, after having undergone quarantine, or on a certificate that the place from which the vessel has arrived is free from any infectious disease. The term is used especially in the S. of Europe with

Prato

reference to vessels arriving from infected ports, and subjected to quarantine.

Prato, often called PRATO in TOSCANA, a walled town of Italy, 10½ miles S. E. of Pistoia and 11 N. W. of Florence; has a citadel and a cathedral with frescoes by Filippo Lippi, though the see has been united with that of Pistoia since 1653. There are manufactures of straw plait, cloth, and paper and brass works. Pop. 15,510.

Pratt, Anne, an English nature writer; born in Strood, England, in 1806. Her numerous books achieved great popularity. Among them are: "Flowers and their Associations" (new ed. 1840); "Field, Garden, and Woodland" (for the young, new ed. 1843); "Chapters on Common Things of the Seaside" (1850); "Green Fields, their Grasses" (1852); "Our Native Songsters" (1852); "Wild Flowers" (1853); "Flowering Plants, Grasses, and Ferns of Great Britain" (1854); "Haunts of the Wild Flowers" (1863). She died July 27, 1893.

Pratt, Charles, an American philanthropist; born in Watertown, Mass., Oct. 2, 1830; removed to New York in 1850, and engaged in the oil business, his firm being eventually merged in the Standard Oil Company. He amassed a great fortune, took an intense interest in educational matters, and founded in Brooklyn the Pratt Industrial Institute, the income of which is derived from the Astral flats, a block of buildings erected and conveyed by him to the institute. He died in New York city, May 4, 1891.

Pratt, John Francis, an American scientist; born in Pomfret, Vt., June 18, 1848; was graduated at Dartmouth College in 1871; then studied civil engineering. In 1871 he became connected with the United States Coast and Geodetic Survey, in which he was made an assistant in 1884; commanded the United States schooner "Yukon" in Puget Sound and the Straits of Fuca, Wash., in 1884-1890; led the expedition to Chilcoat, Chilkat, Skagway, and Dyea to determine the S. E. boundary of Alaska; conducted an expedition to the E. side of Bering Sea and the lower portion of the Yukon river in 1898; and served on numerous other important missions.

Pratt, Orson, a Mormon educator; born in Hartford, Conn., Sept. 19, 1811; became one of the 12 apostles of the Mormon Church (1835), and was in charge of European missions from 1840, many successive years. He was Professor of Mathematics in Deseret University; also church historian and recorder. His writings include: "Divine Authenticity of the Book of Mormon" (6 parts, 1851); "Patriarchal Order, or Plurality of Wives" (1853); "Cubic and Biquadratic Equations" (1866); "Key to the Universe" (1879); and "The Great First Cause." He left in manuscript a

Prayer

"Treatise on the Differential Calculus." He died in Salt Lake City, Oct. 3, 1881.

Pratt, Samuel Jackson, an English author; born in St. Ives, Cornwall, Dec. 25, 1749. Besides his translation of Goethe's "Sorrows of Werther" (1813), his books are: "Sympathy," a poem; "Tears of Genius" (1774), a poem on Goldsmith; "Landscapes in Verse"; "Liberal Opinion" (1775), a novel; "Emma Corbett" (1776), a novel; "Apology for David Hume" (1777); "Pupils of Pleasure" (1779), a novel; "Gleanings through Wales, Holland," etc. (1795); "Gleanings in England" (1796); "The Fair Circassian," a tragedy; "Family Secrets" (1797), a novel; "Cabinet of Poetry" (1808). He died in Birmingham, Oct. 4, 1814.

Pratt Institute, a coeducational non-sectarian institution in Brooklyn, N. Y.; founded in 1887; has an endowment of over \$4,600,000; grounds and buildings valued at \$1,150,000; scientific apparatus, etc., \$325,000; volumes in the library, about 95,000; average number of faculty, 150; average students, 3,800.

Prawn, in zoölogy, *Palæmon serratus*, and, less properly, any other species of the genus. Its ordinary length is about four inches; color bright gray, spotted and lined with darker purplish gray. It is a favorite article of food, and is found in vast numbers in the North Atlantic.

Praxiteles, a celebrated Greek sculptor; born about 360 B. C., who executed several fine statues, in bronze and marble, of Bacchus, a satyr, Venus, and Apollo. An ancient copy of one of his works, the "Apollo Sauroctonos," is the only example extant. He excelled by the grace, tenderness, and finish of his works. He was esteemed as second to Phidias only. He executed a series called "The Labor of Hercules," for the temple erected to that hero at Thebes. Phryne, the celebrated Thespian courtesan, was his mistress, and served as the model for his statues of Venus. Two of his sons acquired fame as sculptors. He died about 280 B. C.

Prayer, a universally acknowledged part of the worship due to God; not merely petition, but, according to the New Testament models and Christian usage, praise, adoration, confession of sin, and thankful acknowledgment of mercies received. It is a simple and natural expression of dependence, which seems almost necessarily to follow from a belief in the existence of a god. Accordingly we find it both where the object of worship is one Supreme Being and in systems of polytheism. According to the Christian system, however, prayer is not the mere spontaneous approach of man to God in the endeavor to appease His wrath, to win His favor, or to obtain from Him any blessing; but the right to approach Him in

Prayer

prayer, and the warrant to expect advantage in doing so, rest on the revelation of His own will. Nor is any truth more indisputably taught in the Bible, or more frequently brought into view, both in the Old and New Testament, than that God is the hearer of prayer. Forms of prayer for public use grew up in the earliest times, naturally and inevitably: the Lord's Prayer being doubtless regarded as a warrant and a model. Apparently the most primitive collection is that in the eighth book of the pseudo-Clementine "Apostolic Constitutions."

Prayer for the dead, in the Roman Catholic, Greek, and other Oriental churches, is offered with the intention and expectation of obtaining for the souls of the deceased an alleviation of their supposed sufferings after death on account of venial sins, or of the penalty of mortal sins, remitted but not fully atoned for during life. The practice of praying for the dead is usually associated with the doctrine of purgatory, or with the belief in a progressive intermediate state. It being once supposed that relations subsist between the two worlds, that their members may mutually assist each other, it is almost a necessary consequence of the doctrine of purgatory that the living ought to pray for the relief of their suffering brethren beyond the grave. It seems certain that some such doctrine existed in most of the ancient religions. Its existence among the Jews is attested by the well-known assurance in II Maccabees, chap. xii., that "it is a holy and wholesome thought to pray for the dead, that they may be loosed from their sins." Catholics contend that the doctrine as well as the practice is equally recognizable in the early Christian Church. They rely on the parable of Lazarus and the rich man (Luke, xvi: 19-31), as establishing the intercommunion of this earth with the world beyond the grave; and on Matt. xii: 32, as proving the remissibility of sin or of punishment after death; as well as on I Cor. xv: 29, as attesting the actual practice among the first Christians of performing or undergoing certain ministrations in behalf of the dead. The Fathers of the 2d, 3d, and still more of the 4th and following centuries frequently allude to such prayers, as Clement of Alexandria, Tertullian, St. Cyprian, and especially St. John Chrysostom, Cyril of Jerusalem, and St. Augustine. The liturgies, too, of all the rites without exception contain prayers for the dead; and the sepulchral inscriptions from the catacombs, which reach in their range from the 1st to the 5th century, contain frequent prayers in even greater variety. In the services of the mediæval and later Church prayers for the dead form a prominent and striking element. The Protestant churches without exception repudiated the practice. In the burial service of Edward VI.'s "First Common Prayer Book" some prayers for the

Preaching

deceased were retained; but they were expunged from the "Second Book"; and no trace is to be found in that sanctioned under Elizabeth. Still it is not expressly prohibited, and it is cherished as a private and pious aspiration by not a few within the modern Church of England, as, in Coleridge's phrase, "something between prayer and wish—an act of natural piety sublimed by Christian hope."

In the United States a sect has arisen called "Christian Scientists," founded by Mrs. Mary Baker G. Eddy, which believes in the efficacy of prayer to heal disease. See CHRISTIAN SCIENCE.

Prayer, Book of Common. See BOOK OF COMMON PRAYER.

Prayer Beads, a name given to the polished seeds of a West Indian leguminous plant, *Abrus precatorius* or wild licorice, formerly much used for stringing into rosaries, necklaces, etc.

Praying Machine, Praying Mill, or Praying Wheel, an apparatus used in Tibet, and other parts of the East, as a mechanical aid to prayer. They are of various forms, the commonest being a cylinder or barrel of pasteboard fixed on an axle, and inscribed with prayers. The devout give the barrel a turn, and each revolution counts as an utterance of the prayer or prayers inscribed. It is common enough to see them fixed in the bed of a running stream, as they are then set in motion by the water, and go on praying night and day, to the special benefit of the person who has placed them there. The Tartars also suspend them over their domestic hearths, that they may be set in motion by the current of cool air from the opening in the tent, and so twirl for the peace and prosperity of the family.

Preaching, the act of preaching; a public religious discourse. The modern system of preaching was unknown in the early Church. The general mode then was for the priest to read portions of the Old or New Testament, and explain or enforce the precepts which they contained. Generally, sermons were delivered whenever the Scriptures were read, and sometimes several, by different persons at the same meeting. Some of Chrysostom's sermons occupied two hours in the delivery, though this was the time generally allotted to the whole service.

About the 13th century, the scholastic divines directed their chief attention to the study of the sacred Scriptures, and were hence called Bible divines, and honored with the pompous titles of profound, sublime, wonderful, seraphic, angelic doctors. They introduced a new and artificial mode of preaching, called declaring. Before this time, the clergy generally adopted postulating, or expounding a large portion of Scripture, sentence by sentence. By the new

method, the preacher read a text out of some book and chapter of the Old or New Testament, dividing it into several parts and expounding them; and, generally, the more numerous the divisions and subdivisions, the better and more highly was he esteemed. The opposition to this textual mode of preaching continued for upward of a century, but at length it came generally to prevail. The divisions or parts of a modern sermon are usually the introduction, the proposition, the illustration, and the application.

Preadamitism, the teaching of Isaac de la Peyrère (1592-1676), a French Calvinist, who asserted that Paul had revealed to him that Adam was not the first man created. Peyrère published a treatise in 1655, based on Romans v: 12-14, but it was publicly burnt, and he was imprisoned at Brussels. His views, however, were espoused by many people.

Prebend, the stipend or maintenance granted to a canon of a cathedral or collegiate church out of its estate; a canonry in England. A simple prebend is one restricted to the revenue only; a dignitary prebend has jurisdiction annexed to it.

Preble, Edward, an American naval officer; born in Portland, Me., Aug. 15, 1761; crossed the ocean to Europe in an American privateer in 1777; served as midshipman in the "Protector" in 1779; was captured and imprisoned for some time in the prison-ship "Jersey"; was promoted captain in 1799, in which year he commanded the "Essex" in the East Indies for the protection of American interests. Early in 1803 he was made commander of the "Constitution"; and in June of that year was placed in command of a fleet sent against Tripoli. He greatly distinguished himself in causing that country to sue for peace, a feat accomplished by a number of skillful bombardments. He returned to the United States and received through Congress the thanks of the nation and a gold medal. He died in Portland, Me., Aug. 25, 1807.

Precedence, the order in which men and women follow each other according to rank or dignity in a State procession or on other public occasions. In England the order of precedence depends partly on statutes, and partly on ancient usage and established custom. Questions arising on matters of precedence depending on usage are hardly considered as definitely settled, and are in a great measure left to the discretion of the officers of arms. The sovereign of course is always first in order of precedence, after whom in descending order follow the Prince of Wales, sons of the sovereign, grandsons of the sovereign, brothers of the sovereign, uncles of the sovereign, the sovereign's brothers' or sisters' sons, the Archbishop of Canterbury, the Lord High Chancellor, and

so on through the high state dignitaries, the various ranks of the peerage, etc. The order of precedence among women follows the same rules as that among men. By the acts of Union of Scotland and Ireland the precedence in any given degree of the peerage has been established as follows: (1) Peers of England; (2) Peers of Scotland; (3) Peers of Great Britain; (4) Peers of Ireland; (5) Peers of the United Kingdom and Peers of Ireland created subsequent to the Union.

Precedent, a judicial decision, interlocutory or final, which serves as a rule for future determinations in similar cases; also a form of proceeding to be followed in similar cases.

Precentor an officer in a cathedral, formerly sometimes called chaunter, and ranking in dignity next to the dean. His stall is on the opposite (N.) side of the choir, and that side is called *cantoris* side, the side of the cantor, as the other is called *decani*, the side of the dean. He has the direction of the musical portion of the service. The precentor is, in cathedrals of the new foundations, a minor canon, and is removable by the dean and chapter.

Preceptory, a religious house of the Knights Templars, subordinate to the Temple, or principal house of the order in London, under the government of an eminent knight. The preceptories of each province were subject to a provincial superior, three of whom ranked above all the rest, viz., those of Jerusalem, Tripolis, and Antioch.

Precession of the Equinoxes in astronomy, the going forward of the equinoxes. The arrival of the sun at the point Aries a little earlier than he might be expected to reach it was first observed by Hipparchus about 150 B. C. Depending, as the phenomenon does, for its explanation, on the law of gravity, Hipparchus could not account for it. Sir Isaac Newton was the first who did so, and that his newly discovered law of gravitation explained the precession of the equinoxes was a confirmation of the accuracy with which he had read the law itself. Excepting only at the two equinoxes, the plane in which the sun moves in his orbit and that in which the earth rotates do not coincide. By the law of gravitation one body does not attract another in mass, but acts on its separate particles. The sun then does not attract the earth as a whole, but tends to pull the parts nearest it away from those in proximity to the center, and the center again away from those on the other side. The bulged-out equatorial zone is specially liable to be thus acted upon, and, but for the rotation of the earth, would be so drawn down toward the ecliptic that it and the equator would ultimately be in one plane. The earth's rotation, however, modifies this action, and simply causes the points at which the earth's equator intersects the

plane of the ecliptic to move slowly in a direction opposite to that in which the earth rotates. This is what is denominated the precession of the equinoxes. It is generally associated with the sun, but the moon is twice as potent in producing it; owing to her comparative nearness to the earth she is able to produce a greater differential effect on the nearer and more remote portions of our planet. The annual motion of the first point of Aries is about 50", and about 25,867 years will be required for the entire revolution. It has been supposed that the precession of the equinoxes may have had some influence in producing the Glacial period.

Precious Metals, gold and silver, so called on account of their value.

Precious Opal, a very pure variety of opal, exhibiting a play of bright and contrasting colors. The most durable are obtained from the mines of Czerwenitz, Hungary; those from Mexico, when first found, surpass them, however, in vividness of color.

Precipitate, a term applied to any solid matter thrown down from a state of solution, by the action of heat, light, or chemical reagent.

Precipitate Ointment, a well-known compound of two kinds, the red and the white. The former contains red oxide of mercury, the latter ammoniated mercury, or white precipitate. In both cases great care is necessary that the mercury preparations are in a very fine state of division, and are intimately mixed with the ointment base. Both ointments are highly stimulating, and are of service in cutaneous eruptions. The red ointment is also employed in chronic conjunctival ophthalmia.

Precognition, previous knowledge or cognition; antecedent examination. In Scotch law, a preliminary examination of a witness, or of one likely to know something about a case, or the evidence taken down; especially an examination of witnesses to a criminal act before a judge, justice of the peace, or sheriff, by a procurator-fiscal, in order to know whether there is ground of trial, and to enable him to set forth the facts in the libel. Such examinations are common in the United States.

Predestination, the act of ordaining, decreeing, or determining events beforehand. In theology, foreordination. The word "predestination" does not occur in the authorized version of the Bible. The verb "to predestinate" is found in Rom. viii: 29, 30, and Eph. i: 5, 11. See FOREORDAIN.

Predicament. See CATEGORY.

Predicate, in grammar, the word or words in a proposition which expresses what is affirmed or denied of the subject. In logic, the term in a proposition, expressing that quality which, by the copula, is af-

firmed or denied of the subject. Thus, in the propositions, snow is white, coal is not white, whiteness is the quality affirmed of snow, and denied of coal. In both cases, therefore, the term "white" is the predicate.

Preemption, the act or right of buying before others. Also, the right of a settler on lands to purchase in preference to others, when the land is sold.

Preexistence, existence previous to or before something else. Also, existence in a previous state; existence of the soul previous to its union with the body. Preëxistence was a doctrine of the Pythagoreans, and several others of the old philosophers, and is still found in many of the Eastern religions.

Preface, something spoken or written as introductory to a discourse, treatise, or other composition; a series of preliminary remarks; an introduction, a preamble, a prologue, a prelude. In Church history, in the Roman and Greek Church, an introduction to the Canon and the Mass. It is an exhortation to thanksgiving, and ends with the Sanctus. The Roman rite recognizes 10 prefaces: The Common, and those of Christmas, Epiphany, Lent, Easter, Ascension, Pentecost, the Trinity, the Apostles, and the Cross. The Greek Church has but one preface. In the Anglican Obedience the preface is said in the Communion Service. In addition to the Common Preface, there are Proper Prefaces for Christmas, Easter, Ascension, Whitsunday, and the Feast of Trinity.

Prefect, a governor, a commander, a chief magistrate; specifically, a title given to several officers, military, naval, and civil, in ancient Rome. Thus, in the times of the kings the officer appointed by the king to act as his deputy when he was compelled to leave the city was called the *Præfectus urbi*, or prefect of the city. Later, during the earlier ages of the republic, when both consuls were required for military service, a *Præfectus urbi* was named by the Senate to act during their absence. He must have held the office of consul, and he enjoyed during the period of his office the same powers and privileges within the walls as the consuls themselves. In times of dearth or famine a commissioner was appointed to procure supplies, his official title being *Præfectus annonæ*, or perfect of corn. In war the whole body of the cavalry was under the command of an officer, also styled a prefect. The captain of a ship of war was called *Præfectus navis*, and the admiral of a fleet *præfectus classis*. Under Constantine the prefectus became governors of provinces. In France a préfet is the civil governor of a department, having control of the police and extensive powers in regard to municipal administration.

Pregnancy

Pregnancy, the quality or state of being pregnant or with child; the state of a female who has conceived or is with child. The first symptom which calls attention to the occurrence of pregnancy is usually absence of the menstrual flow. This may, of course, be suppressed by many other causes; and, exceptionally, may persist during the first few months of pregnancy. "Quickening," or the sensations experienced in consequence of the movements of the fœtus, is usually noticed in the fourth month. Of the changes which take place elsewhere than in the generative organs the first and most noticeable is sickness, usually occurring in the early morning, and not persisting beyond the first three months. "Longings," or cravings for special, and sometimes very curious articles of diet, are not unusual. The heart becomes enlarged in order to provide the increased blood supply necessary for the nutrition of the fœtus. There is often an increased liability to toothache, fainting, and other disturbances of health; and not infrequently the disposition is altered, and an unnatural fretfulness or irritability manifests itself. In some cases, on the other hand, the health is exceptionally good. The duration of pregnancy is, in the great majority of cases, about 275 days; but, as variations of a week or 10 days in either direction are common, it is impossible to predict the exact date of delivery. Well authenticated cases have occurred where it has been prolonged to nearly 300 days. It may, of course, come to an end at any time prior to its proper term. There is a curious condition called spurious pregnancy, which may so closely simulate true pregnancy in all its main features as entirely to deceive the patient as well as others. It is generally associated with hysteria or some allied mental disturbance. A careful examination enables a medical man to detect the mistake; but it may be difficult to persuade the patient and her friends of it. Concealment of pregnancy is a criminal offence, or rather it is taken to be the main proof of the offense of concealing the birth of a child in certain circumstances.

Prelate, an ecclesiastical dignitary of the highest order, having authority over the lower clergy, as an archbishop, bishop, or patriarch; a dignitary of the church.

Prelude, something introductory or preparatory to that which follows; an introductory or preparatory performance; an introduction. In music, a movement played before, or an introduction to a musical work or performance; a short introductory strain preceding the principal movement, performed on the same key as, and intended to prepare the ear for, the piece that is to follow.

Premonstratensian, in Church history, Norbentines; an order of regular canons,

Preposition

founded by St. Norbert, in 1119. The rule was that of St. Austin, and their founder imposed upon his subjects perpetual fasting and entire abstinence from meat. Despite, or possibly because of, the severity of the life, the order flourished greatly, and at one time, according to Hélot, there were more than 1,000 abbeys. At the dissolution in England there were 35 houses of the order in that country, of which two were nunneries and two cells.

Prentice, George Denison, an American journalist; born in Preston, Conn., Dec. 18, 1802; was on the staff of the Hartford "Weekly Review" from 1828 to 1830, when he became editor of the Louisville "Journal," and held that post till his death, making the paper famous for satiric wit and exuberant fun. His best-known work is a volume of witticisms entitled "Prenticeana" (1859). His other publications are "Life of Henry Clay" (1831), and "Poems" (1876). He died in Louisville, Ky., Jan. 22, 1870.

Prentiss, Benjamin Mayberry, an American military officer; born in Belleville, Va. (now W. Va.), Nov. 23, 1819. He removed to Illinois in 1842, and served in the Mexican War as a captain of volunteers. At the beginning of the Civil War he entered the Union army and was made Brigadier-General of volunteers. He was taken prisoner at Shiloh, May 6, 1862; was promoted Major-General in the same year; defeated Generals Holmes and Price at Helena, Ark., July 4, 1863; resigned Oct. 28, 1863, and engaged in civil pursuits in Quincy, Ill. He died Feb. 8, 1901.

Prentiss, Mrs. Elizabeth (Payson), an American writer of fiction; born in Portland, Me., Oct. 26, 1818. Her most popular work was "Stepping Heavenward" (1869), which was translated into several languages. She also published: "Little Susy's Six Birthdays" (1853); "Fred and Maria and Me" (1867); "Aunt Jane's Hero" (1871); "Pemaquid" (1877); "Gentleman Jim" (1878). She died in Dorset, Vt., Aug. 13, 1878.

Prentiss, Seargent Smith, an American orator; born in Portland, Me., Sept. 30, 1808; studied law, and became, about 1827, a resident of Vicksburg, Miss., where he practised with success. He was elected to Congress by the Whigs in 1837. His manner of speaking was at once natural and dramatic, and he had a high reputation as an orator, and as an advocate in jury trials was equal or superior to any lawyer in the Southwestern States. He died near Natchez, Miss., July 1, 1850.

Prepontis. See MARMORA.

Proposition, a part of speech, so named because originally prefixed to the verb, in order to modify its meaning. Prepositions

Preradovic

serve to express: (1) The relations of space, and (2) other relations derived from those of space, and marked in some languages by case-endings. Prepositions are usually placed before the word which expresses the object of the relation; as, heat from fire, he is going to Chicago from New York, a house on a hill, etc. Frequently, however, the preposition is placed after the object of the relation: as, Whom are you speaking of? what are you thinking of? what house do you stop at? etc. Prepositions are either simple or compound. Simple prepositions are at, by, for, from, in, on, out, to, up, with; compound prepositions are across, after (a comparative from of), against, above, about, along, amid, amidst, among, athwart, but, into, over, through, toward, until, unto, within, without. The prepositions concerning, during, except, notwithstanding, outtake, etc., arise out of a participial construction.

Preradovic, Peter, a Croatian poet; born in Grabonitza, March 19, 1818. He wrote: "Firstlings," a collection of short poems (1846); "New Songs" (1851); "The First Men" and "The Slavic Dioscuri," epics. He died Aug. 18, 1872.

Pre-Raphaelism, an English school of painting, which has in recent years sprung into existence, and has been thus named, in accordance with an erroneous idea, that its earliest members were mainly anxious to imitate the mannerisms of the artists who painted before the time of Raphael. The fact was, that they imitated no pictures, and painted from nature only, but accepted the title of Pre-Raphaelites because it was their object to oppose that system of art which had grown up since the time of Raphael; one of the main characteristics of which was the pursuit of beauty at the expense of truth; while another was a servile obedience to traditional conventionalism.

Pre-Raphaelite Brotherhood, an association founded in 1848 by William Holman Hunt, John Everett Millais, and Dante Gabriel Rossetti, the last of whom suggested the title "Brotherhood." They were some time afterward joined by Thomas Woolner (sculptor), James Collinson, Frederick George Stevens (art critics), and William Michael Rossetti. With few exceptions, the whole of the English-speaking press attacked them, as Mr. Ruskin thought unfairly, and he defended them in a letter to the London "Times" (May 5, 1854).

Prerogative, in English history, an exclusive privilege of the crown, the expression the prerogative being employed for the whole or any part of such exclusive privilege. The prerogative may be confined or limited by the supreme legislative authority, and has in fact been much restricted,

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notably by Magna Charta (1215), the Habeas Corpus Act (1679), the Bill of Rights (1628), and the Act of Settlement.

Presburg, a town of Hungary; on the left bank of the Danube; 40 miles E. by S. of Vienna and close to the Austrian frontier. It is backed by the spurs of the Little Carpathians, and is a pleasant town. Its principal buildings are the cathedral, a Gothic edifice of the 13th century (restored in the middle of the 19th), in which the Kings of Hungary used to be crowned; the Church of the Franciscans (1290-1297); the town house (1288), with a natural history collection; the Parliament house, in which the Hungarian representatives used to meet till 1848; and some private houses. The royal castle (1645) was destroyed by fire in 1811. There is an academy of jurisprudence and philosophy. The chief objects of manufacture are beer, dynamite, wire, starch, spirits, confectionery, biscuits, etc.; and there is considerable trade in corn, sheep, cattle, swine, and wine. Presburg grew to be a prominent town during the 11th and 12th centuries, and was frequently chosen for conferences and meetings between the rulers of Austria and Hungary. From 1541 (when the Turks seized Buda) down to 1784 it was the capital of Hungary. The town was taken by Bethlen Gabor in 1619, by the Austrians in 1621, and was bombarded by Davout in 1809. Here, Dec. 26, 1805, Napoleon concluded a treaty with the emperor after the battle of Austerlitz. Pop. (1900) 65,867.

Presbyopia, a change in the power of vision, not usually noticed till about 45 years of age, when near objects come to be less distinctly seen than those at a distance. See EYE.

Presbyter, an elder, or a person advanced in years who had authority in the early Christian Church (I Peter v: 1). Also, in the Presbyterian Church, a member of a presbytery; specifically, a minister.

Presbyterian Church, a name applied to those Christian denominations, who hold that there is no order in the Church as established by Christ and his apostles superior to that of presbyters (see PRESBYTERS), and who vest church government in presbyteries, constituted of ministers and elders, possessed of equal powers thus without superiority among themselves. Presbyterianism does not recognize the term bishop as the superior of the presbytery, because these two names or titles in the New Testament, are used interchangeably of the same persons. Presbyterians hold that the authority of their ministers, is derived from the Holy Spirit, which is symbolized by the imposition of the hands of presbytery collectively. They affirm that all Christian ministers,

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being ambassadors of Christ, are equal by their commission. The congregation elects its own minister and elders, and also its deacons and trustees—the former of the last two, takes charge of the charities of the church, and the latter of its temporal or financial affairs. The session, consisting of the minister and elders, has the spiritual oversight of the church members. The Presbytery is constituted by ministers and elders in equal numbers. A congregation for the time without a pastor, can be represented in the presbytery by an elder. An appeal may be made to the presbytery from congregations or sessions. A synod consists of a number of presbyteries within defined boundaries. The General Assembly is the highest court of the church, and consists of representatives from all the presbyteries, each minister is accompanied by an elder from the same presbytery.

The church government by elders or presbyters, was in existence among the children of Israel when in bondage in Egypt (Ex. iii: 10). They were rulers and also representatives of the people, and as such under varied conditions were recognized during the entire history of the Jewish Church, including the time between the close of the prophetic period and the coming of Christ. Then, as was natural, a similar order of rulers thus derived, passed, informally, over into the Jewish Christian Church at Jerusalem, and as such was adopted (Acts xi: 30). The same order of church government was introduced by Paul and the other apostles into the churches composed of converted Gentiles. That order of church government in Old Testament times was recognized as of Divine authority, which character Presbyterians believe it did not lose when transferred and adopted by the primitive Church. The Presbyterian polity is democratic—republican, as the church members elect their own officials and are thus able to utilize their best men.

The first Presbyterian Church in modern times was founded in Geneva by John Calvin, about 1541; and the constitution and doctrines were thence introduced, with some modifications, into Scotland by John Knox, about 1560, though the Presbyterian was not legally recognized as the national form of church government till 1592. For nearly a century after this date, there was a continual struggle in Scotland between Episcopacy and Presbyterianism; till ultimately by the Treaty of Union in 1707, it was agreed on the part of England and Scotland that that form of church government should be the national form of ecclesiastical government in Scotland, and that the Scotch Church should be supported as the only one established by law. Besides the Established Church of Scotland, there are other important religious bodies whose constitu-

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tion is strictly Presbyterian, but who, from conscientious scruples, decline being connected with, or receiving any emoluments from the State. The chief of these are the Free Church and the United Presbyterian Church.

Shortly after the Reformation Presbyterianism was in considerable strength in England, a large number of the Puritans preferring that system of government to episcopacy; but owing to the arbitrary measures of Cromwell, it subsequently declined in strength. There were in the British Isles, in 1640, three Confessions of Faith, the Scottish, the Irish, and the Thirty-nine articles of the Church of England—the English Presbyterians had not formed a confession. The sentiment began to prevail in Protestant circles, that there should be formulated for the whole kingdom a Confession of Faith in which all could unite, the Presbyterians taking the lead desired to have summoned “an assembly of divines and learned laymen under the protection of Parliament, who should be free in its action from the domination of the prelates.” “A Grand Remonstrance” numerously signed by prominent men was presented to Charles I. (1641), asking him to summon such an assembly. He refused the request. Soon after Parliament on its own responsibility, issued directions for selecting the members of the proposed assembly. They were enjoined to meet in Westminster, on July 1, 1643. On the same day King Charles issued a proclamation forbidding the assembly to meet, which, however, it did. There in that place a session was held by the assembly which continued for three years, during which time long conferences and discussions were held at intervals. Thus was formulated the Westminster Confession of Faith around which Presbyterians have rallied for more than 250 years. The assembly consisted of 121 divines; 10 noblemen; 20 from the House of Commons—there were only 10 or 12 independents or Congregationalists in the assembly. The Scotch Presbyterian Church also sent commissioners.

Soon after the Restoration episcopacy, which had been displaced as the State church, was restored, and about 2,000 Presbyterian clergy were ejected from their cures in consequence of the Act of Uniformity, which came into force Aug. 24, 1662. Presbyterianism has ever since been simply one of the forms of dissent in England, and has held no prominent position, though many Presbyterian churches are scattered throughout England. Of these by far the greater number are united to form a single body, the Presbyterian Church of England. There sprang up in England a few congregations connected with the Church of Scotland, and with what was formerly known as the “Secession Church,” now the United Presby-

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terian Church. The number of such afterward very much increased. At the time of the formation of the Free Church of Scotland the greater number of the English Presbyterian churches connected with the Church of Scotland sympathized with the cause of the Free Church, and took the name of the Presbyterian Church in England. In 1876 a union, which had been long desired, was consummated between the synod more intimately related to the Free Church of Scotland and the congregations belonging to the United Presbyterian Church. The name assumed by the united church is the Presbyterian Church of England. At the time of the union the Presbyterian Church in England had about 150 churches, and the United Presbyterian Church more than 100. At the same date the Church of Scotland in England had about 20 congregations.

The first Presbyterians in America were emigrants from the British Isles, and the first Presbyterian church in America was founded in the colony of Massachusetts in 1629. It was the outgrowth of a Presbyterian congregation that landed there in 1625. This movement was projected by Presbyterian leaders in the S. of England and also in London. It was designed to be a colonization on a higher principle than the desire for gain. Rev. Samuel Skelton was its pastor. Rev. Francis Makemie, the father of the Presbyterian Church in the Middle Colonies, in 1699, founded a Presbyterian church at Snow Hill, Md. The first Presbytery of which there remains a record was constituted in 1706 at Freehold, N. J. Tradition says Makemie was its moderator. In 1716 a synod was formed of the four presbyteries that had grown out of the first one. Its title was: "The Synod of Philadelphia." Dissensions ensued, and a division for 17 years; but in 1768 the American Presbyterian churches were reunited in one ecclesiastical body; and in 1788 a general assembly was instituted, the whole number of congregations being then 419, and of ministers 188.

The increase of the church was rapid, and in 1834 it contained 22 synods, 111 presbyteries, and about 1,900 ministers. In 1801 a plan of union was adopted between Presbyterians and Congregationalists, under which hundreds of congregations were formed in the State of New York and elsewhere. The Cumberland Presbyterians separated from the main body in 1814; and in 1838 the American Presbyterian Church was divided into two great sections, commonly known as Old School and New School Presbyterians. The portion of the Old School branch residing in the slave-labor States withdrew in 1861 from their brethren in the other States and formed "The Presbyterian Church of the Confederate States of America." Now it is known as "The South-

Presbytery

ern Presbyterian Church."

The Old and New School branches reunited in the assembly of 1870, and on the basis of the Westminster Confession of Faith and the catechisms to which standards of doctrine both schools had adhered during the 32 years of separation. Strictly speaking, questions of doctrine had little to do with the division. At the time of this reunion the Old School Presbyterians counted 2,381 ministers, 2,749 churches, and 258,903 communicants; while the New School numbered 1,614 ministers, 1,479 churches, and 143,645 communicants. The United church had five theological seminaries. A revision of the Confession was commenced in 1891 and is now in progress. It is also proposed to formulate a creed which shall express the doctrine of all the branches of the church. There are several branches which virtually hold the polity of the Presbyterian Church in the United States, each having its own theological seminaries and colleges, such as the Presbyterian Churches Northern and Southern, the Cumberland, the Reformed, United Presbyterian, Reformed Dutch, German, etc. The total of all 12 bodies of Presbyterians in the United States reported by "The Christian Advocate" in 1910 was: Ministers, 12,935; churches, 16,224; members, 1,848,046. By the middle of the 18th century Presbyterian ministers were laboring in Nova Scotia and Quebec, the various divisions of the home churches being represented at an early stage; but most of the early ministers came from the Secession Church. A union between the sections representing the Free and United Presbyterian Churches took place in 1861. The Presbyterian Church in Canada is strong and prosperous, with six theological colleges. In 1903 the Presbyterian Church in the United States of America (Northern branch) completed a revision of the Confession of Faith, and in 1907 absorbed the Cumberland Presbyterian Church; but in 1909 the Tennessee Supreme Court decided this act of union non-effective.

Presbytery, in the Presbyterian Church, a court of judicature above the session and beneath the synod. It is composed of all the ministers of an assigned district, with a representative ruling elder from each. These elders hold office for six months, and are capable of reelection. Professors of theology are members of that presbytery in which the college is situated. The moderator opens and closes each meeting with prayer. The functions of the court are executive, not legislative. The presbytery supervises all the congregations within its bounds, hears appeals from the decisions of sessions, examines candidates for the ministry, licenses probationers, and ordains ministers by laying on of hands (I Tim. iv: 14). Appeal lies from it to the synod.

Prescott

Prescott, William Hickling, an American historian; born in Salem, Mass., May 4, 1796, the son of a distinguished lawyer and



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statesman, and grandson of Col. William Prescott, an officer of the Independence War. He entered Harvard College in 1811, and graduated in 1814. While at college he had the misfortune to lose, by an accident, the sight of one of his eyes, while the other became so weakened as to deter him from

any profession or pursuit in which strong eyesight was indispensable. Enabled by the possession of an independent fortune to follow the bent of his inclinations, he spent two years in wandering in England, France, and Italy, and then returned to his native country, where he married and settled down to a life of literary labor, which was rarely interrupted. Having made himself master of the literature of France, Italy, and Spain, he contributed as the first fruits of his careful and various readings some critical papers to the "North American Review"; and at last, in 1827, selected the reign of Ferdinand and Isabella as the subject of a more extensive work. Unable from the weakness of his eyesight to pursue an historical work requiring reference to various Spanish authorities, he had recourse to a reader, whom he taught to pronounce Castilian with accuracy sufficient for his own ear, and with this inadequate assistance he became acquainted with the great authorities on Spanish history whom it was necessary to consult in the prosecution of his arduous labors. In this tedious process of collecting and digesting his materials 10 years rolled on, but at length, in 1838, his great work was published, and was received with the utmost enthusiasm both in England and America; while Germany, France, and Spain acknowledged the new historian by transplanting his work into their respective languages; and the Spanish capital elected him a member of her Royal Academy of History.

Stimulated by success, and with his skill considerably increased by practise and experience, Prescott set about the composition of "The Conquest of Mexico," which he published in 1843, and four years later

Prescription

he gave to the world "The Conquest of Peru." These elaborate and charmingly written works, like their predecessor, were received in both hemispheres with immense applause. They have frequently been reprinted, and they bid fair to remain the standard histories of some of the most interesting and eventful periods of human action and enterprise. Prescott was chosen corresponding member of the French Institute; and in 1850 he paid a short visit to Europe, where he was received with the highest distinction. On his return to America he began the composition of what he intended to be the greatest achievement of his latter years, "The History of Philip II." Of this work two volumes appeared in 1855, and a third in 1859; these volumes bear ample testimony to the undiminished genius of the author, and the world was looking forward to the completion of this work, and many others from the same brilliant pen, when he was suddenly attacked by paralysis. Prescott was an elegant scholar and writer, a man of cheerful humor and affectionate character, methodical in his habits, and persevering in his pursuits. He walked five miles regularly every day, composing as he walked. He gave one-tenth of his ample income in charity, and divided his time between his winter mansion in Boston, a summer residence at Nahant, and a farmhouse, where he spent the autumn. In his large library, with the light carefully regulated for his imperfect vision, he wrote with a stylus each day what he had composed, which was then copied, read over, and carefully corrected. His life, by George Ticknor, was published in 1864. He died in Boston, Jan. 28, 1859.

Prescription, in English law, a claim or title to a thing by virtue of immemorial use, enjoyment, the right or title acquired by such use or by possession had during the time, and in the manner fixed by law, as a right of way, of common, or the like. Uninterrupted enjoyment or use for 30, or in many cases for 20 years, gives a *prima facie* title by prescription to the thing enjoyed, and enjoyment for 60 years, unless such enjoyment has continued under some consent or agreement, gives an absolute and indefeasible title. Prescription differs from custom, which is a local usage and not annexed to any person, whereas prescription is a personal usage. In Scotch law, positive prescription is a claim or title to lands acquired by uninterrupted possession upon some written title for a period of 20 years. Negative prescription is the loss or omission of a right by neglecting to use it during the time limited by law. The term is also used for limitation in the recovery of money due by bond, etc. In medicine, a direction of remedies for a disease, and the

Presentment

manner of using them; a recipe; a written statement of the remedies or medicines to be taken by a patient.

Presentment, in law, a very comprehensive term; including not only presentments properly so called, but also inquisitions of office and indictments by a grand jury. Properly speaking, it is the notice taken by a grand jury of any offense from their own knowledge or observation, without any indictment laid before them at the suit of the crown; as the presentment of a nuisance, a libel, and the like; upon which the officer of the court must afterward frame an indictment, before the party presented can be put to answer it. In commerce, the presenting a bill of exchange to the drawee for acceptance or to the acceptor for payment.

Preserved Provisions. The preservation of dead organized matter from the natural process of decay is a most useful means of increasing and diffusing the food supply of the world. Animals, vegetables, and fruits may all be easily preserved for this purpose. The preserving of fruits is an old and familiar process. This is generally effected by boiling or stewing, though drying is also frequently resorted to, where the fruit is meant to be kept intact. Fruits intended for confectionery are preserved in four different ways: (1) In the form of jam, in which the fruit is boiled with from one-half to about equal its weight of sugar. (2) In the form of jelly, in which the juice only is preserved, by being carefully strained from the solid portions of the fruit, and boiled with a third to a half of its weight of sugar. (3) By candying, which consists in taking the fruits whole or in pieces, and boiling them in a clear syrup of sugar previously prepared. They absorb the syrup, which is then crystallized by the action of a gentle heat. (4) By stewing them in a weak syrup of sugar and water till they become soft but not broken, and transferring them with the syrup to jars, adding pale brandy equal in quantity to the syrup. Several kinds of vegetables, as cabbages, cucumbers, cauliflowers, and onions, are preserved by pickling. Antiseptics are used to preserve meat also, salting being the most common process. But to preserve large quantities of vegetable and animal products for food purposes, and at the same time to keep them nearly in their fresh state, they must be subjected to one of three processes. These are — drying, refrigeration, and exclusion of air. With vegetables, which contain so large an amount of water in proportion to their solid and nutritious material, the process of drying is peculiarly applicable, and it is largely employed as the means of furnishing fresh vegetable food for ships in a compact and portable form, when, in addi-

Preserved Provisions

tion to desiccation, compression is also employed.

The preservation of articles of food by the application of cold is the simplest of all known methods, and in such climates as North America, Russia, etc., it is largely taken advantage of; while of late it has generated a large and increasing trade between Great Britain and the Australian colonies. In 1875 ice began to be used to preserve fresh meat in considerable quantities, which was sent from America to Europe. In 1879 the invention of the Bell-Coleman refrigerator increased immensely the facilities for such a traffic. This invention has been succeeded by others, chief among them being the Haslam refrigerator; and the result is that the distribution of meat over the surface of the globe is being revolutionized. The trade between Great Britain and New Zealand in fresh mutton is now immense. The modern methods of refrigeration for carrying purposes consist of an air-tight room on board ship, where the meat is kept, and through which dry cold air is made to circulate by means of special machinery driven by steam, the air being first compressed and cooled, and a further cooling taking place when it is again allowed to expand.

The process of preservation by exclusion from the action of atmospheric air is yearly assuming more importance and being more largely practised. The most perfect method, and that which is now most generally resorted to, is the inclosure of the food in air-tight cases from which the air is then expelled; on the perfection of the air-excluding process depends entirely the preservation of the article. The first successful attempt to preserve fresh meat in this way was made in 1809 by M. Appert, a Frenchman. The plan now generally adopted is commonly known as canning, and is applicable alike for meats, vegetables, and fruits. The process is usually as follows: The provisions of whatever kind are packed into a tin cylinder, and the interstices filled in with water or other appropriate fluid, as gravy in the case of flesh food. The lid, which is perforated with a small aperture or pinhole, is soldered carefully down. The cases are then set in a bath of solution of chloride of calcium; heat is applied till the whole boils, and the air is thus expelled through the pin holes. These holes are then hermetically closed, and the can and its contents are once more subjected to the operation of heat till the provisions are perfectly cooked. When it has become cool the can is removed to the proving room, an apartment the temperature of which has been raised to the degree of temperature most favorable to decomposition. If the operation has been successfully performed, the ends or

President

sides of the can will have fallen in to some extent from the outward pressure of the air. If, after the interval of some days, the ends bulge out, it is a certain sign that the process has not been successful, the liberated gases causing the outward pressure. Such should be rejected or submitted again to the process. Not only may boiled provisions be preserved in this way, but roast meats also. An improvement on this process has been effected by introducing into the can a small quantity of sulphite of soda, which causes the absorption of any traces of free oxygen which may lurk in the cases. According to a report in the "American Grocer," the recognized authority on canned goods, the total output of canned tomatoes in the United States in 1897 was 4,149,000 cases, and the total pack of corn in the United States and Canada was 2,909,000 cases. There were 38 canneries in California, and the pack for the season of 1898 was 2,384,000 cases of 24 cans each, divided as follows: Tomatoes, 306,000; asparagus, 81,500; peas, 30,000; beans and other vegetables, 8,500; pie fruit, 30,000; jams and jellies, 8,000; table fruits, 1,920,000; total, 2,384,000 cases. The value of the pack is placed at \$5,000,000.

President, The, an American frigate, the flagship of Capt. John Rodgers in the early part of the War of 1812. It was a sister ship of the "Constitution" and the "United States." It defeated the British ship "Endymion" on Jan. 15, 1815, but was obliged to surrender to her consorts. The name also of an American steamer which sailed from New York for Liverpool, March 21, 1841. It was sighted on the 24th, but was never seen again.

President of the United States, the chief executive of the government. He is Commander-in-Chief of the army and navy of the country, and has the nomination of most of the executive officers of the government, besides a large number of judicial and administrative functionaries. He is elected for a term of four years, and is eligible for any number of reelections, though, in conformity with the precedent set by George Washington, no President has yet been elected more than twice. President Cleveland, up to date, is the only President who has ever been reelected after an interregnum. The President has a veto power and unlimited pardoning prerogative as to offenders against National laws. His salary is \$50,000 a year, and his residence, during his presidency, is the White House in Washington. He is elected by an electoral college, which in some contingencies makes the choice by States, and he may receive a minority of the popular vote and yet be legally chosen to the office. In case of his death or total disability the func-

Presidential Succession

tions of the office devolve on the Vice-President, who is elected coincidentally with the President, and is the presiding officer of the Senate. The following is the list of Presidents up to the present: George Washington, 1789 and 1793; John Adams, 1797; Thomas Jefferson, 1801 and 1805; James Madison, 1809 and 1813; James Monroe, 1817 and 1821; John Quincy Adams, 1825; Andrew Jackson, 1829 and 1833; Martin Van Buren, 1837; William Henry Harrison (died April 4, 1841), 1841; John Tyler (elected as Vice-President), 1841; James Knox Polk, 1845; Zachary Taylor (died July 9, 1850), 1849; Millard Fillmore (elected as Vice-President), 1850; Franklin Pierce, 1853; James Buchanan, 1857; Abraham Lincoln (assassinated April 14, 1865), 1861 and 1865; Andrew Johnson (elected as Vice-President), 1865; Ulysses S. Grant, 1869 and 1873; Rutherford B. Hayes, 1877; James A. Garfield (died by assassination Sept. 19, 1881), 1881; Chester A. Arthur (elected as Vice-President), 1881; Grover Cleveland, 1885; Benjamin H. Harrison, 1889; Grover Cleveland, 1893; William McKinley, 1897 and 1901 (assassinated Sept. 6, 1901); Theodore Roosevelt, 1901 and 1905; William H. Taft, 1909.

Presidential Bee, an expression frequently used in the United States, and referring to a man who has aspirations to the presidential chair and uses his influence accordingly. Such an one is said to have the "presidential bee in his bonnet."

Presidential Succession, the order in which a vacancy in the office of the President of the United States can be filled pending a new election. The 49th Congress passed a measure entitled "An Act to provide for the performance of the duties of the office of President in the case of removal, death, resignation, or inability both of the President and Vice-President." The measure was approved by the President Jan. 19, 1886. The text is as follows:

§ 1. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in case of removal, death, resignation, or inability of both the President and Vice-President of the United States the Secretary of State, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of the Treasury, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of War, or if there be none, or in case of his removal, death, resignation, or inability, then the Attorney-General, or if there be none, or in case of his removal, death, resignation, or inability, then the Postmaster-General, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of the Navy, or if there be none, or in case of his removal, death, resignation, or inability, then the Secretary of the Interior, shall act as President till the disability of the President or Vice-President is removed or a President shall be elected: Provided, That whenever the powers and duties of the office of President of the United States shall devolve on any of the persons named herein, if

Congress be not then in session, or if it would not meet in accordance with law within 20 days thereafter, it shall be the duty of the person on whom said powers and duties shall devolve to issue a proclamation convening Congress in extraordinary session, giving 20 days' notice of the time of meeting.

§ 2. That the preceding section shall only be held to describe and apply to such officers as shall have been appointed by the advice and consent of the Senate to the offices therein named, and such as are eligible to the office of President under the Constitution, and not under impeachment by the House of Representatives of the United States at the time the powers and duties of the office shall devolve upon them respectively.

Presidents, Mother of. See MOTHER OF PRESIDENTS.

Presidio, a Spanish word for "a fort," applied especially to four Spanish fortified posts on the coast of Morocco — Ceuta, Melilla, Alhucemas, and Peñon de Velez.

Press Associations, organizations for the collection and sale of news. The first attempt in this line in the United States was in 1829, when J. W. Webb founded the "Courier and Enquirer" in New York and began to collect news ahead of his rivals, thus forcing them to buy it from him. The first combination of newspapers was made in New York in 1849 under the name of the Associated Press. In 1865 the Western Associated Press was established in Chicago, and in 1882 the United Press Association was organized in New York. Between these three associations a bitter rivalry sprang up, which was intensified by the organization of various smaller associations which sided with one or the other of the three rivals. Numerous compromises were made, but no definite agreement was reached, and in 1892 the United Press absorbed the Associated Press. In 1894 the United Press Local News Association was started in New York. Gradually, however, the smaller associations were absorbed or driven out of business, till, by a series of combinations, the Associated Press again came to the front, and monopolized practically the entire industry in the United States.

Press Clipping Bureau, an office for supplying newspaper and magazine clippings on any required subjects to any person desiring them. There are several such bureaus in New York, Chicago, and other large cities, doing an extensive business in this novel line. A person desiring clippings on a given subject usually pays a subscription fee to the bureau and then a fixed rate for each 100 or 1,000 clippings. An author wishing to collect criticisms or notices of his own work, a business man wishing to be informed of any new movement among others in the same line of business — in a word, any one who wishes published notes on any subject he is interested in, finds the press clipping bureau a unique and helpful agency. When a patron's order is re-

ceived, the entire office force is set at work scanning newspapers and magazines from all parts of the country for any allusion to the subject desired. All such notices are cut out, marked with the place and date of publication, and sent at once to the subscriber.

Press, Liberty of the, the liberty of every citizen to print whatever he chooses, which at the same time does not prevent his being amenable to justice for the abuse of this liberty. The right of printing rests on the same abstract grounds as the right of speech, and it might seem strange to a man unacquainted with history that printing should be subjected to a previous censorship, as it is in some States, and has been in all, any more than speaking, and that the liberty of the press should be expressly provided for in the constitutions of most free States. But when we look to history we find the origin of this, as of many other legislative anomalies, in periods when politics, religion, and individual rights were confusedly intermingled. It is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right; and to England we are particularly indebted for the establishment of this principle. The existence of a censorship of the press was for centuries, however, deemed an essential to the safety of all European governments. Liberty of printing, as we understand it, is a comparatively modern notion; Milton's plea for a free press met with no response from his own party, nor for very many years later was it the cue of any party in the English commonwealth to refrain from suppressing the writings of their political opponents. In England the liberty of the press, soon after printing was introduced, was regulated by the king's proclamations, prohibitions, charter of license, etc., and finally by the court of star-chamber. The Long Parliament, after their rupture with Charles I., assumed the same power. The government of Charles II. imitated their ordinances, and the press did not really become free till the expiration of the statutes restricting it in 1693, after which it was found impossible to pass new laws in restraint of it, and it has remained free ever since, the last restriction being done away with on the abolition of the newspaper stamp duty, in 1856. Such legal checks as remain are merely intended to prevent outrages on religion or decency, to protect subjects from defamation, and to conserve the copyright of authors. The constitution of many of the United States declare, as we should expect, for the liberty of the press. The same may be said of all the South American republics. Among European countries, it may be generally said the liberty of the

press is found most predominant among the weaker powers, such as Spain, Turkey, Sweden and Norway, Switzerland, and Rumania; in France the press may be said to be comparatively free; while in Germany, Austria, and particularly in Russia, there are still many restrictions. In the British colonies the law is as in England, but in India the governor-general exercises a censorship.

Pressburg, a town in Hungary; 35 miles E. of Vienna, on the left bank of the Danube, and on spurs of the Little Carpathians. The most striking edifice is the ruined royal palace, on the top of an eminence, burned in 1811. The cathedral is a large Gothic structure, dating from the 11th century, which has latterly been considerably modernized; here the kings of Hungary were crowned. The Franciscan Church (13th century) is also noteworthy. There are also several palaces, including that of the primate of Hungary. The river is here crossed by a bridge of boats. The manufactures are various. The trade, particularly transit, and chiefly in corn and timber, is extensive. Pressburg is a place of very great antiquity, and was long a fortress of some strength. In 1541, when the Turks captured Buda, it became the capital of Hungary, and retained the honor till the Emperor Joseph II. restored it to Buda. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. Pop. (1900) 65,867, more than half of whom are Germans, and 7,000 Jews.

Pressed Steel Car Construction. In the early days of railroads in the East, wood was used almost exclusively as the material of framed structures. Not merely the trestle viaducts, but even the important long-span bridges were constructed of timber. Half a century ago this was a matter of necessity, and today, on Western roads, it is still one of economy. With the growth of the steel industry and the great cheapening of iron and steel structural shapes, it was only a question of time before these wooden bridges would be replaced by more serviceable and safe metal structures, and as the country opened up by the pioneer railroads in the West is being settled and its resources developed, the same substitution of steel for wood is taking place.

Strange to say, though the use of iron and steel in the construction of the rolling stock of the railroads was advocated and experimentally attempted nearly half a century ago, it is only within the last three or four years that the steel car has been able to assert its superiority over wooden railroad cars, and thereby bring within measurable distance the time when, at least for the transportation of freight, all-steel rolling stock will be exclusively used. The

same arguments which favored the introduction of steel bridges, steel ships, and skeleton-steel buildings, are now operating to produce a revolution in the freight car business, which is one of the most remarkable economic facts in the field of transportation. Briefly stated the argument from a structural standpoint is based upon the fact that though a cubic foot of Southern yellow pine or Oregon pine when built into the car will average about 50 pounds in weight as against a weight per cubic foot of steel of 490 pounds, the maximum strain allowed in calculating the necessary section of the various members of a wooden freight car is only 1,100 pounds to the square inch, as against a unit of stress allowed in the case of steel of 13,000 pounds per square inch; figures which show a theoretical superiority weight for weight of steel over wood, say of about 20 per cent. This saving would apply only to such parts of a car as were subjected to direct tension or compression. Seventy-five per cent. of the material in the car acts as a beam, however, and is subjected to transverse strains; and here the saving of weight, strength for strength, will amount to about 9 per cent. Hence it is estimated that the theoretical saving of weight on the whole car is about 11 per cent. In making the connections and joints of the steel parts, however, there is not so much sacrifice of materials as in a wooden car; and this 11 per cent. advantage must therefore be increased proportionately. Moreover it is safe to say that in a comparison of two cars of the same carrying capacity and strength, the "factor of safety" will be found to be larger in the steel car than in the earlier type.

What is suggested by theory is proved by actual facts, for in a wooden car of 30,000 pounds weight empty, and 60,000 pounds carrying capacity, the ratio of the load to the total weight of car when loaded is 66.67 per cent., whereas in a pressed steel car of 80,000 pounds capacity, weighing 28,500 pounds, the ratio of load to total weight when loaded is 73.75 per cent., while in the case of a pressed steel ore car of 100,000 pounds capacity, weighing 28,000 pounds, the ratio of load to total weight when loaded is about 78.1 per cent. Another and valuable advantage of the pressed steel car is that its life is notably double that of the wooden car. It was officially reported by the Western railway of France in the year 1897 that steel cars built in 1869 had lost only 6 per cent. of their weight by corrosion in an interval of 28 years.

As a result of the reduction of the dead weight of the car there are numerous advantages to which the roads that have adopted the new system refer in justification of their policy. Thus the capacity of the individual car being increased, a reduced number of cars is required to haul a given

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amount of freight. From this it follows that there is a reduced amount of empty car hauling to be done, and a reduced amount of switching service. The train length is shorter, and hence it is easier to back trains into sidings and otherwise handle them in the various yards of the roads. There is also a reduced payment for car mileage and cost of inspection; and lastly, there is a decrease in the cost of repairs from an average of say \$35 to \$40 per annum for the wooden car to an average, as proved by reports received from the railroad companies, of from \$10 to \$15 for the steel car. We have before us an interesting comparison given by Mr. Von Z. Loss in a paper read before the International Railroad Congress, Paris, showing the comparative earnings of wooden and pressed steel cars operating under average conditions of service in the United States. The figures are worked out on a basis of costs and earnings per ton per mile on an assumed yearly mileage of 5,000 miles loaded and 5,000 miles empty. The cost per ton per mile of both live and dead weights is assumed at 3 mills and the gross earnings per ton per mile of freight in the Eastern States of America at 6 mills. Of 1,000 pressed steel gondola cars, recently figured on, against specifications for wooden gondolas of 80,000 pounds capacity, the wooden car weighed 18.2 tons and was of 82,000 pounds of coal capacity. The steel car weighed 16.1 tons, and had a capacity of 86,200 pounds of coal. In the case of the wooden car the yearly income from lading hauled 5,000 miles at the given rate amounted to \$1,230. The cost of hauling the lading was \$615 and the cost of hauling the dead weight \$546, so that the net earnings for the year of the wooden car amounted to \$69. In the case of the pressed steel car the yearly income from lading amounted to \$1,293. The cost of hauling the lading amounted to \$646.60, the cost of hauling the dead weight amounted to \$483, the net earnings of the steel car per year working out as \$163.50, or \$94.50 in excess of those of the wooden car. Hence it was shown the increased earning capacity of the car during its life of 30 years would be \$2,835, and the increased earning capacity of 1,000 steel cars over 1,000 wooden cars during a life of 30 years would be \$2,835,000. It is estimated in the paper above referred to that the average capacity of the existing wooden cars in the United States is about 25 tons and that the total capacity of all wooden cars in the United States is 37,500,000 tons. From this it is figured that on the basis of an average annual mileage per car of 3,500 miles, and an average cost per ton per mile of 3 mills and average gross earnings of 8 mills, the total yearly profit from all wooden cars is \$215,000,000. If the above mentioned freight of 37,500,000

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tons were to be concentrated in large capacity, pressed steel cars, the total dead weight would be cut down from 21,000,000 tons to 14,000,000 tons, which would represent a hauling expense saving of 7,000,000 tons. Of course the above figures are given merely in a general way for comparison, and must not be applied too literally, for the reason that there must be certain localities where the conditions of railroad service, and the nature of the freight to be carried, would not favor the use of large-capacity cars, but even if the statement be largely modified by this consideration, the argument will still be enormously strong in favor of the new system of construction.

That the above estimate of the economies realized by the use of steel cars is not exaggerated is rendered likely by the remarkable popularity which they have achieved with the railroad companies. Though the first pressed steel car was built as late as 1897 the industry has grown at such a rate that at the beginning of the year 1902 there were 46,000 pressed steel cars in use, and at the present time about 10,000 men are employed at the four different works of the Pressed Steel Car Company in turning out new cars at the rate of over 100 per day. The two largest factories are located at McKee's Rocks and at Allegheny, at each of which works over 4,000 men are employed. There are also two smaller works at Joliet and Pittsburg, each employing about 600 men. Of the two larger concerns, the one at Allegheny is the older. In spite of the frequent enlargement of the latter establishment during the past three years, it was found necessary to purchase new ground at McKee's Rocks and erect an entirely new plant to accommodate the rapidly increasing business.

The steel used in the manufacture of the cars is what is known as medium soft Carnegie, with an ultimate strength of 60,000 pounds to the square inch, and an elongation of 25 per cent. in 8 inches, with a reduction of area of 50 per cent. The buildings are laid out with a view to a minimum amount of handling of the material, which moves from shop to shop in a regular sequence of operations, till it is hauled out on the tracks from the paint shop in trains of finished cars, to be taken to the various railroads of the country.

The stock, in the shape of plate steel, is first marked out with templets and sheared to the finished size. It then undergoes either heavy pressing or light pressing. The larger pieces, such as longitudinal car sills for the under framing, and also such pieces as require but slight forming in the presses, are pressed cold, and one realizes what an economy in labor there is in the manufacture of these cars in see-

ing how rapidly the side sills, many of them 40 feet in length, are pressed into shape, the work being done in three strokes of the hydraulic press. The first stroke brings up the center of the sill where its section is deepest and two more strokes serve to bring up the shallower ends. As a matter of fact the whole operation of forming side sills of the largest dimensions occupied only one and a quarter minutes. The smaller and more complicated pieces, which are more difficult to bring up to shape, are first heated in the furnace to a bright cherry red, and are then subjected to light pressing in a smaller hydraulic press.

After pressing the parts are taken to the construction department, where the work is almost entirely one of drilling and riveting, the work of the presses being of such accuracy as to involve a minimum amount of fitting. As much of the machine riveting as possible is done in the construction department, and the material is then passed on to the erecting department, where the cars are put together and such hand-riveting done upon them as is necessary. Here the draft gear and brakes are put in as ordered, each road having its own special preference as to type and pattern. In the erecting shop there are four aisles with series of parallel tracks extending down them. Upon these the cars are erected. The axles come to the tracks rough turned, where they are finished and put upon the wheels by hydraulic pressure. See SCHOEN, C. T.

Pressensé, Edmond de, a French Protestant theologian; born in Paris, Jan. 24, 1824; studied at the university there, next under Vinet at Lausanne, and Tholuck and Neander at Halle and Berlin, and in 1847 became a pastor at Paris. He was deputy to the National Assembly for the Seine department in 1871-1876, and was elected a senator for life in 1883. A strong thinker and vigorous writer, as well as eloquent preacher, Pressensé took a foremost part in the great theological as well as ecclesiastical controversies of the day; published many learned and important books, most of which have been translated into English and German; and contributed to the theological and literary magazines on both sides of the Channel. He died April 8, 1891.

Press Gang, the name given in England to a detachment of seamen who (under a naval officer) were empowered, in time of war, to lay hold of seafaring men and compel them to serve in the king's ships.

Pressure, Center of. See CENTER.

Prester John, Presbyter, or Priest John, a name given in the Middle Ages to a supposed Christian sovereign, said to hold his empire in some central part of Asia

(Tibet), though, according to the Portuguese, he was King of Abyssinia. Oungh Khan, Khan of the Khrim Tartars, in the beginning of the 13th century, is, however, regarded as the actual individual mentioned as Prester John, that person having taken priest's orders, thereto induced by the missionaries who had penetrated the country through Mesopotamia and Armenia, followers of the Nestorian creed.

Presto (Italian), quick, used in music to designate a faster rate of movement than is indicated by *allegro*. *Presto assai* denotes very quick, and *prestissimo* the highest degree of quickness.

Preston, a municipal and parliamentary borough of England, in Lancashire, 27 miles N. E. of Liverpool, on a height above the right bank of the Ribble, near the head of its estuary. The environs of the town exhibit much pleasing scenery, and the town possesses three fine public parks. Among the churches Christ Church is admired for the purity of its Norman architecture; the parish church, which has been rebuilt in the Decorated style of the 14th century, is also a fine building; and one of the Roman Catholic churches, St. Walburga's, is considered the finest in the town. The town hall is a fine structure; and generally, the architecture of Preston is good. The river is spanned by five bridges, two of them railway bridges, one of which cost \$50,000. The railway station (recently reconstructed) is very large, and is one of the most important junctions on the London and Northwestern Railway. The original staple manufacture of the town was linen, which is still woven to some extent, but has been completely eclipsed by the cotton manufacture, of which Preston is now one of the chief centers. Preston also has machine shops, iron and brass foundries, railway carriage works, breweries, malt houses, roperies, tanneries, etc. Some shipping trade is carried on, and extensive harbor and river diversion works in course of construction at an estimated cost of \$4,000,000 are expected to vastly improve the town as a port. In 1323 Preston, originally Priest's town, was taken and burned by Robert Bruce; in the great civil war it espoused the Royalist cause, and was twice captured by the Parliamentarians; in the rebellion of 1715 it was occupied by the Jacobite forces; in that of 1745 the Highlanders, headed by the Pretender, passed through Preston both on their march to London and on their retreat. Preston was the birthplace of Arkwright. It returns two members to Parliament. Pop. (1901) 112,989.

Preston, Harriet Waters, an American author; born in Danvers, Mass., about 1843. At an early age she became noted as a linguist, and afterward achieved a bril-

liant reputation as a translator from the Latin and Provençal languages, and as an essayist. Besides her translations of Mistral's "Mirèio" (1873), Vergil's "Georgics" (1881), and several others, she has published of her own original work: "Aspendale" (1881); "Troubadours and Trouvères" (1876); "A Year in Eden," with Louise Dodge (1886); "Private Life of the Romans" (1893); and "Love in the Nineteenth Century."

Preston, Mrs. Margaret (Junkin), an American author; born in Philadelphia about 1825; was a resident of Lexington, Va., and later of Baltimore, Md. Her writings deal chiefly with the period of the Civil War, the best known being: "Silverwood" (1856), a novel; "Beechenbrook, a Rhyme of the War" (1866); "Cartoons"

presumption "juris" (of law) is one established in law until the contrary is proved. A presumption "*hominis vel judicis*" (of the man or judge) is one which is not necessarily conclusive, though no proof to the contrary be adduced.

Pretender, one who made claim to a throne under a pretense of right (as Perkin Warbeck, Lambert Simnel, in English history); specially applied to the son and grandson of James II., the heirs of the House of Stuart, who laid claim to the throne of England, from which they had been excluded by Parliament in 1688. The former, often termed the Old Pretender, died in 1776; his son, Charles Edward Stuart, the Young Pretender, in 1788.

Pretoria, the capital of the former South African Republic (Transvaal), 980 miles



DEATH OF PRIAM, BY BENVENUTO.

(1875); "Colonial Ballads" (1887); "Aunt Dorothy" (1890). She died in 1897.

Preston, William, an American diplomatist; born near Louisville, Ky., Oct. 16, 1816; practised law in Louisville; was sent as minister to Spain in 1858; was a member of Congress 1852-1855; joined the Confederates in 1861; and was made a Brigadier-General. He died in Lexington, Ky., Sept. 21, 1887.

Presumption, in law, in the absence of direct evidence that which comes nearest to the proof of a fact. Presumptions are of three degrees: Violent, in which those circumstances appear which necessarily attend the fact; probable, arising from such circumstances as usually attend the fact; and light (without validity). A presumption "*juris et de jure*" (of law and from law) is where law or custom assumes the fact to be so on a presumption which cannot be traversed by contrary evidence. A

from Cape Town and 285 miles W. of Lorenzo Marques, on Delagoa Bay, to which a railway was opened in 1895. Pretoria was founded in 1855 by the Boer leader Pretorius. On the establishment of the South African Union in 1910 it became the seat of the executive government. Pop. (1904) 15,539.

Preveza, or Previsa, a fortified town in the extreme S. W. of European Turkey; on the N. side of the entrance to the Gulf of Arta. It exports valonia acorns, wool, cotton, and oil. The Venetians held the town from 1683 to 1797. One year later Ali Pasha drove out the French garrison and plundered the place.

Prévost, Eugène Marcel, a French novelist; born in Paris, May 1, 1862. His first story, "The Scorpion" (1887), the tragic history of a clerical tutor in a Jesuit school, made a deep impression because of the fine psychological insight and intimate knowledge of the priestly life it displayed.

It was followed by "Our Helpmate: Provincials and Parisiennes" (1885); "Choncette" (1888); "Mlle. Jaufre" (1889), perhaps his best work; "Cousin Laura: Stage Morality" (1890); "A Lover's Confession" (1891); "Women's Letters" (1892); "A Woman's Autumn" (1893); "The Mill at Nazareth" (1894); "The Demi-Virgins" (1894); "More of the Women's Letters" (1894); etc.

Prévost-Paradol, Lucien Anatole, a French diplomatist; born in Paris, France, Aug. 8, 1829. In 1851 he obtained from the Académie Française the prize for eloquence, for his "Eulogy on Bernardin de Saint-Pierre." In 1856 he became one of the editors of the "Journal Des Débats," and was elected a member of the French Académie in 1865. His literary and political essays are among the soundest, the most acute, the most scholarly, and the most elegant that have proceeded from the French journalists of the empire. We may mention in particular his "Elizabeth and Henry IV.," "Jonathan Swift" (in Latin); "Universal History" (1854); "The Family's Share in Education" (1857); "New Essays on Politics and Literature" (1862); "Study of French Moralists" (1864). In 1870 he came to the United States as minister plenipotentiary, and he was at Washington only a few days when he committed suicide, Aug. 11, 1870.

Priam, a King of Phrygia, and the last sovereign of Troy. Soon after his accession, the discovery of a gold mine in his kingdom enabled him to enlarge and beautify his capital, strengthen its defenses, and raise a powerful army. Under his reign Troy was regarded as the largest, richest, and most magnificent city, and himself as the most powerful monarch in Lesser Asia. By his first wife he had only one child; but by Hecuba, his second queen, he had a numerous family. The perfidy of his son Paris in eloping with Helen led to the long and fatal war, which, after enduring for 10 years, terminated in the entire overthrow of the state, the destruction of Ilium, the death of most of his sons, and his own murder by the ruthless Pyrrhus, the son of Achilles, as enfeebled by age, he clung to the horns of his domestic altar. Priam's death occurred about 1184 B. C.

Priapus, son of Dionysus and Aphrodite, born at Lampsacus on the Hellespont, considered as a divinity of fruitfulness, especially of flocks of sheep and goats, of bees, the vine, and of all kinds of garden produce. His statues usually stood in gardens, in the form of rude wooden images, painted vermilion, with a club, sickle, and phallic symbol of exaggerated dimensions.

Pribram, a mining town of Bohemia, 48 miles S. S. W. of Prague, employs 6,000

men in the royal lead and silver mines, and various manufactures. There is a mining academy, and a church much frequented by pilgrims. Pop. 13,412.

Pribilof Islands, a group of islands on the coast of Alaska, in Bering Sea. The largest are St. Paul, St. George, Walrus, and Beaver Islands. They are frequented by numbers of fur seals. The natives are Aleutians.

Price, Bonamy, an English political economist; born in Guernsey, England, May 22, 1807. He was graduated at Oxford in 1829, and in 1868 became Professor of Political Economy there. He published "The Principles of Currency" (1869); "Chapters on Practical Political Economy" (1878); etc. He died in London, Jan. 8, 1888.

Price, Richard, an English philosopher; born in Tynton, Glamorganshire, Feb. 22, 1723. He was a Dissenting minister, and was pastor of a congregation at Hackney. He was the friend of Benjamin Franklin, and sympathized warmly with the American colonists. His tables of vital statistics and calculations of expectancy of life were the basis of modern annuities and life insurance; his economic and financial writings were of a high order, and the younger Pitt consulted him on finance. His principal writings are: "An Appeal to the Public on the Subject of the National Debt" (1771); "Civil Liberty and the Justice and Policy of the War with America" (1776); "Review of the Principal Questions in Morals" (3d ed. 1787); "The American Revolution and the Means of Rendering It a Benefit to the World" (1784). He died April 19, 1791.

Price, Sterling, an American military officer; born in Prince Edward co., Va., Sept. 11, 1809; received a collegiate education, and settled in Missouri in 1831; was elected to Congress in 1844; served in the Mexican War as colonel and Brigadier-General of volunteers; was military governor of Chihuahua in 1847; governor of Missouri in 1853-1857, and president of the State Convention in February, 1861. When the Civil War broke out he joined the Confederate army, and became Major-General of Missouri militia in May, 1861. He fought through many campaigns and greatly distinguished himself; was commander of the Department of the West in 1862, and afterward of the districts of Tennessee and Trans-Mississippi. At the close of the war he went to Mexico, but in 1866 returned to Missouri. He died in St. Louis, Mo., Sept. 29, 1867.

Prichard, James Cowles, an English ethnologist; born in Ross, Herefordshire, Feb. 11, 1786. He studied medicine, and took the degree of M. D. at Edinburgh;

Prickly Ash

commenced practice in Bristol, and in 1810 received the appointment of physician to the Clifton Dispensary and St. Peter's Hospital. In 1813 he published his great work, "Researches into the Physical History of Mankind," and in 1843 appeared his "Natural History of Man." He wrote many minor works on ethnology, besides treatises on various medical subjects. In 1845 he left Bristol for London, where he died, Dec. 22, 1848.

Prickly Ash, a name given to several prickly shrubs of the United States, genus *Xanthoxylum*, order *Rutaceæ*. They have an aromatic and pungent bark, which from being used as a remedy for toothache gains them the name of toothache tree.

Prickly Heat, a skin disease, characterized by minute papulæ formed by the hyperæmia of the sweat follicles. Few Caucasian residents in the tropics escape it when they are exposed to the sun. It is not in the least dangerous.

Prickly Pear, *Opuntia vulgaris*, natural order *Cactaceæ*, otherwise called Indian fig. The opuntia is a fleshy and succulent plant, destitute of leaves, covered with clusters of spines, and consisting of flattened joints inserted upon each other. The fruit is purplish in color, covered with fine prickles, and edible. The flower is large and yellow. It is a native of the tropical parts of America, whence it has been introduced into Europe, Mauritius, Arabia, Syria, and China. It is easily propagated, and in some countries is used as a hedge plant. It attains a height of seven or eight feet.

Pride, Thomas, an English military officer; one of the most resolute of Cromwell's soldiers; born in London of humble origin. At first a drayman and brewer, he enlisted at the commencement of the Civil War, and by his merit quickly rose to be colonel. He commanded a brigade under Cromwell in Scotland, and, when the House of Commons betrayed a disposition to effect a settlement with the king, was appointed by the army to purge it of its Presbyterian royalist members. "By "Pride's Purge" about 100 were excluded, whereupon the House, thus reduced to about 80 members, proceeded to bring the king to justice. Colonel Pride sat among his judges, and signed the death-warrant. He died Oct. 23, 1658.

Prideaux, Humphrey, an English scholar; born in Padstow, Cornwall, May 2, 1648; was educated at Westminster School under Dr. Busby, and then at Christ Church, Oxford. His "Marmora Oxoniensia" (1676); an account of the Arundel Marbles, procured for him the friendship of Lord Chancellor Finch, who in 1679 appointed him rector of St. Clement's, Oxford, and in 1681 a prebendary of Norwich.

Priest

After several minor preferments he was collated in 1688 to the archdeaconry of Suffolk, and in 1702 was made dean of Norwich. His works include a "Life of Mahomet" (1697), long very popular; and "The Connection of the History of the Old and New Testament" (1715-1717; 27th ed. 1876). The last treats with much learning, but less discernment, the affairs of ancient Egypt, Assyria, Persia, Judæa, Greece, and Rome, so far as they bear on the subject of sacred prophecy. He died Nov. 1, 1724.

Pride of China (also called pride of India and bead tree), a handsome tree of the order *Meliaceæ* (*M. azedarach*), a native of India, naturalized in the Southern States of the American Union. It grows rapidly, has large bunches of flowers, and enormous quantities of small fruit. A decoction of the bark of its root is used as a vermifuge.

Pride of Gratz and Styria, the *Johanneum*, an institution in the city of Gratz, Austria, founded by Archduke John, in 1812, for the encouragement of the arts and manufactures of Styria. It is richly endowed in the various departments of science, art, mineralogy, antiquities, and coins, and has a chemical laboratory, a botanical garden, and a library.

Prie Dieu, a kneeling desk for prayers.

Priene, anciently one of the 12 cities of Ionia; stood a little N. W. of the mouth of the Mæander in Caria. Here in the second half of the 19th century the remains of an elegant Ionic temple to Athene Polias were examined by an agent of the British Society of Dilettanti, who carried off and gave to the British Museum the stone bearing the inscription that recorded its dedication by Alexander the Great.

Priest, one who in any religion performs the sacred rites and, more or less, intervenes between the worshiper and his God, especially by offering sacrifice.

In patriarchism, under this dispensation the patriarchs themselves exercised priestly functions, *e. g.*, sacrifice (Gen. xxii: 1-13) and blessing (xxvii: 28, 29). The case of Melchisedek belongs to an older ritual, by no means confined to Palestine.

In Judaism, a descendant of Aaron, and therefore one of the sacred caste. The Jewish priests filled all the important offices in connection, first with the tabernacle and then with the temple worship, less important ones being handed over to the Levites, and those still more menial to the Nethinims. They constituted a sacred hierarchy, of which the high priest was the head. Their chief duties were to offer sacrifices for themselves and the people, and intercede for them with God. The priests were divided into 24 courses for the

service of the temple (I Chron. xxiv: 1-19; Luke i: 5). Probably the "chief priests" were the heads of these courses, with any high priest out of the office (Matt. xxvi: 3).

In the New Testament, a rendering of the Greek *hiereus*. In this sense applied largely to Christ (Heb. v: 6, vii: 11, 15), the Great High Priest of our profession, and, in an inferior sense, to Christians in general, inasmuch as they offer spiritual sacrifices (I Pet. ii: 5; Rev. i: 6, v: 10, xx: 6), but never used of any order in the Christian ministry. In the Anglican Church, a clergyman in priest's orders, as distinguished from a deacon. Only a priest can administer the Holy Communion and read the Absolution. In the Roman Church, a cleric who has received the third grade in holy orders, and who is thereby empowered to "offer, bless, rule, preach, and baptize."

Priest John. See PRESTER JOHN.

Priest, Josiah, an American author; born in New York, about 1790. He was an unschooled man, a harnessmaker by trade; but published several books, some of which became very popular. Among them were: "Wonders of Nature" (1826); "View of the Millennium" (1828); "Stories of the Revolution" (1836); "American Antiquities" (1838); and "Slavery in the Light of History and Scripture" (1843). He died about 1850.

Priestley, Joseph, an English natural philosopher; born in Fieldhead, England, March 13, 1733. At the age of 22 he became assistant minister to an Independent congregation at Needham Market, in Suffolk, whence he removed to Nantwich, in Cheshire, and next to Warrington, where the Independents had formed a seminary. While tutor in this institution, he published the "History and Present State of Electricity," which procured his election into the Royal Society, and the degree of doctor of laws from Edinburgh. It was here also that his political opinions were first manifested, in an "Essay on Government." Soon after this he left Warrington, and went to Leeds, where he made those important discoveries with regard to the properties of fixed air, for which he received the Copley medal of the Royal Society in 1772. In 1776 he communicated to the same learned body his observations on respiration, in which he first experimentally ascertained that the air parts with its oxygen to the blood as it passes through the lungs. He had already declared himself a believer in the doctrine of philosophical necessity, and expressed some doubts of the immateriality of the soul. The doctrine he supported in his "Disquisitions on Matter and Spirit," and the obloquy which these works brought on him, producing a coolness in

his patron, Lord Shelburne, to whom he was engaged as librarian, the connection was dissolved, the doctor retaining an annuity of £150 per annum, by original agreement. He next removed to Birmingham, where he became once more minister of an Independent congregation, and occupied himself in his "History of the Corruptions of Christianity," writing, also, in support of the claims of the Dissenters for a repeal of the test acts. But it was the French revolution that afforded him the widest field, and he did not fail to display his warm sympathy with it. This excited the indignation of the High Church party; and in the riots which took place in July, 1791, his house, library, manuscripts, and apparatus were committed to the flames by the mob, and he was exposed to great personal danger. After this he removed to Hackney, where he succeeded Dr. Price; but, in 1794, compelled by incessant persecutions to fly his intolerant country, came to the United States and took up his abode at Northumberland, Pa. His works extend to between 70 and 80 volumes. Besides those before mentioned are: "Experiments and Observations on Air"; "Lectures on General History," on the "Theory and History of Language," and on the "Principles of Oratory and Criticism"; "Hartleian Theory of the Human Mind"; "Letters to a Philosophical Unbeliever"; "History of Early Opinions Concerning Jesus Christ"; "General History of the Christian Church"; "Institutes of Natural and Revealed Religion," etc. As a natural philosopher, his fame principally rests on his pneumatic inquiries. He died in Northumberland, Pa., Feb. 6, 1804.

Priests of the Mission. See LAZARISTS.

Prim, Juan, a Spanish general; born in Reus, Dec. 6, 1814; rose rapidly to be a colonel, and so distinguished himself in war and statesmanship as to be made general, marshal, and marquis. As a Progressist he opposed Espartero. Failing in an insurrectionary attempt in 1866, he fled to England and Brussels, but here he guided the movement that in 1868 overthrew Isabella. He was war minister under Serrano, but soon became virtually dictator. He secured the election of an Italian prince, Amadeo, as king (in order, as was thought, that the king might be under the minister's control), and was thereupon shot by an assassin as he left the Cortes, Dec. 28, 1870. He died on the 30th.

Prima Donna, the first female singer in an opera.

Primary Rocks, a term formerly including all the crystalline and non-fossiliferous rocks which were deposited, it was believed, anterior to the appearance of life upon the

Primate

earth. At first the term comprehended rocks afterward called Plutonic and Metamorphic. Then it was limited to the latter; now applied to Palæozoic rocks.

Primate, the chief ecclesiastic in certain churches. The Archbishop of York is called the Primate of England, the Archbishop of Canterbury the Primate of All England, and the Roman Catholic Archbishop of Baltimore the Primate of the United States.

Primates, the first and chief of Linnæus' orders of the class Mammalia. He included under it four genera: *Homo* (one species, five varieties), *Simia* (21 species), *Lemur* (three species), and *Vespertilio* (seven species). Cuvier ignored the order, classing Man as *Bimana* (Owen's *Archencephala*), and Apes and Lemurs as *Quadrumana*; the bats now constitute an order by themselves, and the lemurs rank as a sub-order. With the advance of zoölogical and anatomical knowledge the use of the name has revived "for the apes, not only by naturalists, who, like Huxley, retain man within its limits; but also by others (*e. g.* Professors Isidore Geoffroy St. Hilaire and Gervais), who consider he should be excluded from it." Huxley defines the primates as having "never more than $I. \frac{1}{4} - \frac{1}{2}$ ". The haluk is always provided with a flat nail (with occasional individual exceptions), and is capable of a considerable amount of abduction and adduction." He divides it into three sub-orders: (1) *Anthropidæ*, (2) *Simiadæ* (apes and monkeys), and (3) *Lemuridæ*.

Primaticcio, Francesco, an Italian painter; born in Bologna, in 1490; was a pupil of Innocenzo da Imola, and afterward assistant to Giulio Romano. He was one of the artists employed by Francis I. and Henry II. to decorate the palace of Fontainebleau; was sent to Rome to form a collection of casts of ancient works of art; and was afterward named superintendent of royal buildings. The numerous large frescoes which he painted at Fontainebleau were destroyed in 1738. He was made abbot of St. Martien de Troyes in 1544, and died in Paris in 1570.

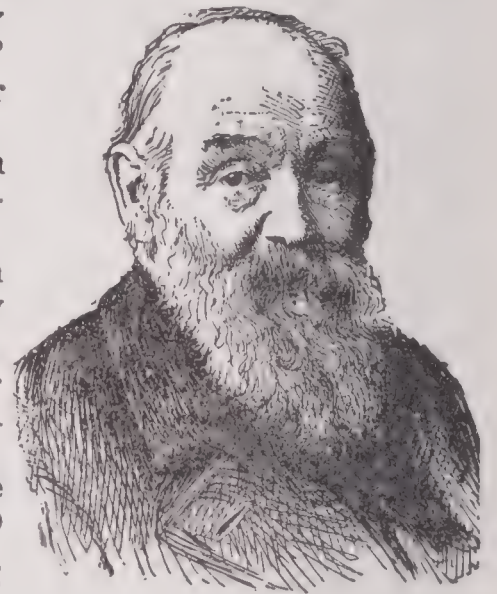
Prime, in the Roman Catholic Church one of the canonical hours, and also the service in the breviary which falls to be performed at that time. The term is derived from the Latin *prima* (that is, *prima hora*, first hour), because prime begins with the first hour of the day according to the Eastern mode of reckoning, namely, 6 o'clock.

Prime, Samuel Irenæus, an American editor; born in Ballston, N. Y., Nov. 4, 1812; was first a minister in the Presbyterian Church. About 1840 he became editor of the New York "Observer," and remained in charge till his death. He was

Prime Minister

the author of over 40 volumes, the best known being: "Travels in Europe and the East" (1855); "Letters from Switzerland" (1860); "The Alhambra and the Kremlin" (1873); "Life of Samuel F. B. Morse" (1874). He died in Manchester, Vt., July 18, 1885.

Prime, William Cowper, an American author; born in Cambridge, N. Y., Oct. 31, 1825. He wrote: "Owl Creek Letters" (1848); "The Old House by the River" (1853); "Later Years" (1854); "Boat Life in Egypt and Nubia" (1857); "Tent Life in the Holy Land"; "Coins, Medals, and Seals" (1861); a work on the hymn "O Mother Dear, Jerusalem" (1865); "I Go a-Fishing" (1873); "The Holy Cross" (1877); "Pottery and Porcelain of all Times and Nations" (1878). He edited "McClellan's Own Story," with biography (1886); "Along New England Roads"; etc. He died Feb. 14, 1905.



WILLIAM C. PRIME.

Prime Conductor, the metallic conductor of an electrical machine.

Prime Meridian, that meridian from which longitude is measured. In Great Britain and its dependencies it is the meridian of Greenwich; in the United States, the meridian of Washington.

Prime Minister, an officer of State, who at the summons of the sovereign has succeeded in forming an administration, of which he is the head, and which may be named after him. It may be assumed that those who accept office under him agree with his policy in the main. Though each member of the ministry administers his own department independently of his colleagues, all important departmental matters are submitted to him, the most important being brought before the whole ministry, and no appointment of moment is made or recommended to the crown without his knowledge and concurrence. His own patronage is very extensive. In forming an administration, he selects all those who are to fill the various offices, though the appointments are subject to the sovereign's approval. In England it is on his advice that as vacancies occur the archbishops, bishops and deans and the highest judges

are appointed, and over one hundred crown livings are filled; and on his recommendation that the most envied temporal titles and honorable distinctions — peerages, baronetcies, and the Garter, for example — are conferred, and such high appointments as the lord-lieutenancy of Ireland, the viceroyalty of India, the principal ambassadorships and colonial governorships, and and lord-lieutenancies of countries, are made by the crown. He is the leader of the House of Parliament of which he is a member. Yet as prime minister he enjoys no legal precedence over his colleagues, his official existence being indeed not recognized by statute. In European governments the prime minister, or premier, is usually charged with the management of diplomatic affairs, and in this respect resembles the Secretary of State of the United States.

Prime Number. A number or quality is prime when it cannot be exactly divided by any other number or quantity except 1. Two numbers or quantities are prime with respect to each other, when they do not admit of any common divisor except 1.

Primero, or Prime, a game at cards popular in England in the 16th century, but now obsolete. The same or a very similar game was played in Italy under the name *primiera*, and in France under the names *prime*, *ambigu*, etc. Primero belonged to the family of games of which the old post and pair and the more modern brag and poker are members.

Prime Vertical Transit, a transit instrument so mounted that it revolves in the plane of the prime vertical, its horizontal axis in this case pointing N. and S. It is used for the accurate determination of either star declination or terrestrial latitudes, or in some special investigations of the stellar parallax.

Priming, in steam engines, the entrance of water spray along with steam into the cylinder of an engine. It always causes great annoyance. The use of muddy water, insufficient steam room, carelessly constructed flues and pipes, etc., in the boiler, give rise to priming. Superheating the steam is one remedy. Priming valves, a species of spring valves, fitted to the cylinder, are so adjusted as to eject priming by the action of the piston.

Primitive Methodists, a section of the Wesleyan community which arose in Staffordshire, England, under the leadership of Hugh Bourne (1792-1852). Having held camp meetings like those in the United States, he was censured for it by the English Wesleyan Conference in 1807, and, seceding, formed a new connection, the first class meeting of which was held at Standley, in Staffordshire, in 1810. In doctrine

the Primitive Methodists agree with the Wesleyans. They more freely admit laymen to the part in their government. In 1910 there were reported in the United States 97 Primitive Methodist churches, 77 ministers, and 7,295 members.

Primogeniture, the state of being the eldest of children of the same parents; seniority by birth among children. Also, the right, system, or rule under which, in England, in cases of intestacy, the eldest son of a family succeeds to the real estate of his father to the absolute exclusion of the younger sons and daughters.

Primordial Zone, a name applied by Barrande to the group of strata which in Bohemia underlies the Silurian rocks, and is therefore on the horizon of the Cambrian system, as that is now generally understood by geologists.

Primrose, the *Primula vulgaris*. The leaves and umbels are subsessile, the former ovate, oblong, crenate, toothed, wrinkled; the scape umbellate, sessile or stalked; the calyx tubular, somewhat inflated, the teeth very acute; the corolla pale yellow. Common in copses, pastures, hedgebanks, and woods, or by the side of streams. Its rootstock is emetic. The peerless primrose is *Narcissus biflorus*.

Primrose Day, in England the anniversary of the death of Lord Beaconsfield, April 19 (1881). Every member of the Primrose League wears a bunch of primroses on that day in token of sympathy with, and support of, the objects of the league.

Primrose League, a league having for its objects "the maintenance of religion, of the estates of the realm, and of the imperial ascendancy of the British empire." It works by means of "habitations," of which there are a large number in the United Kingdom, India, Africa, and the British possessions generally. Its members are divided into knights, dames, and associates, by far the greater part belonging to the latter class. Its headquarters are at St. Margaret's Offices, Victoria street, Westminster, London.

Primulaceæ, primworts; an order of perigynous exogens, alliance Cortusales. Herbs, generally with radical exstipulate leaves. Flowers on radical scapes or umbels, or in the axil of the leaves. Calyx five, rarely four, cleft, inferior or half superior; corolla monopetalous, regular, five, four, or six-cleft. Stamens equal in number to the divisions of the petals, and opposite to them. Ovary one-celled; style one, stigma capitate. Capsule with a central placenta, seeds many, peltate. Chiefly from the N. temperate zone. Tribes: Primulidæ, Anagallidæ, Hottonidæ, and Samolidæ. Known genera 29, species 215 (Lindley).

Prince

Genera 18, species about 200 (Sir J. Hooker).

Prince. (1) One who holds the first, or chief, place or rank; a sovereign; the ruler of a country or state (originally applied to either sex). (2) The ruler or sovereign of a state or territory which he holds of a superior, to whom he owes certain services. (3) The son of a sovereign, or the issue of the royal family; as, the princes of the blood. In heraldic language, the title of prince belongs to dukes, marquises, and earls of Great Britain, but in ordinary use it is confined to members of the royal family. On the continent of Europe the title of prince is borne by members of families of very high rank, though not immediately connected with any royal house.

Prince Albert, a town of Saskatchewan, Canada; on the S. bank of the North Saskatchewan river, and on the Canadian Northern railway, 247 miles by rail N. of Regina (*q. v.*), 425 miles N. W. of Winnipeg in a direct line and 575 miles by rail. There is communication by steamer to Battleford. The town is situated on gradually rising terraces, affording excellent natural drainage, and within reach of easily developed water power. The surrounding district is exceptionally rich, being devoted to the cultivation of wheat, mixed farming, and cattle raising. Gold and platinum are found in the vicinity. Prince Albert is a new and thriving town. The chief business streets are River, Central, and King. The most prominent buildings are the Dominion Government building—including the post office, customs and court houses, crown lands, and land titles offices—Central School, Roman Catholic and Anglican cathedrals, Board of Trade, Bank of Ottawa and Canadian Bank of Commerce buildings, and Victoria Hospital. There are 2 parks. Prince Albert has Roman Catholic, Anglican, Presbyterian, Methodist, and Baptist churches, and Salvation Army barracks. It is the seat of an Anglican and of a Roman Catholic bishop. The charitable and educational institutions include St. Patrick's Orphanage, Victoria Hospital, high, public, and convent schools, and the Mechanics' Institute and Library. There are a semi-weekly and a weekly newspaper. The leading industries are lumbering and the sawing of lumber, which in 1906-07 had an output of 65,000,000 feet, employing nearly 2,000 men, with a monthly pay-roll of more than \$50,000; flour milling, tanning, brewing, pork packing, and brick making. The water works and sewerage and electric light plants are owned and operated by the municipality. The town's assets in 1906 were \$346,967, and its liabilities \$111,725. In 1866 a Presbyterian mission was founded on the site of Prince Albert. During the half-breed rebellion of 1885 it was defended against the rebels and the Presbyterian

Prince Rupert's Drops

Church was used as a fort. Pop. (1906) 3,005, with 1,400 immediately surrounding the town limits; local est. (1907) 5,500.

Prince Edward Island, an island forming a province of the Dominion of Canada, in the Gulf of St. Lawrence, and separated by Northumberland Strait from New Brunswick on the E. and Nova Scotia on the S.; greatest length, from E. to W., about 130 miles; breadth, varying from 4 to 34 miles; area, about 2,134 square miles, or 1,365,760 acres, of which over 1,000,000 are under cultivation. The coast line presents a remarkable succession of large bays and projecting headlands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is eminently agricultural and pastoral, the forests now being of comparatively limited extent. The soil consists generally of a light reddish loam, sometimes approaching to a strong clay, but more frequently of a light and sandy texture. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild; winter, though long and cold, is free from damp, unwholesome chills; and summer, without being oppressively hot, is fitted to promote the growth of all the ordinary cereals. Sheep, cattle, and horses are reared in numbers; cod, mackerel, herring, oysters, and lobsters form the most productive part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use; there are also several tanneries, and ship-building is carried on to a considerable extent. The exports consist of timber, agricultural produce, and live stock; the imports of dry goods, hardware, cordage, iron, etc. A railway runs from one end of the island to the other. The capital is Charlottetown. Pop. (1901) 12,080; local est. (1907) 12,500. Public affairs are administered by a lieutenant-governor nominated by the crown, who appoints an executive council of nine members. There is also a legislative council of 13, and a House of Assembly of 30 members, both chosen by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot. It was first colonized by France, captured by Great Britain in 1745, restored and recaptured, and finally in 1873 was admitted to the Dominion of Canada. Pop. (1901) 103,259.

Prince of Wales. See WALES, PRINCE OF.

Prince of Wales, Cape, the extreme N. W. point of North America; lat. 65° 33' N.

Prince of Wales Island. See PENANG.

Prince Rupert's Drops, drops of melted glass consolidated by falling into water. If

Princes Islands

a fragment be broken off the thin end, they fly to pieces with explosive force.

Princes Islands, a beautiful group of nine islets near the E. end of the Sea of Marmora, about 10 miles S. E. of Constantinople, the largest being called Prinkipo. They are a favorite summer resort of the Constantinople Greeks, and in old times were frequently a place of exile for those who were in disfavor at the Byzantine court.

Princeton, a town in Mercer co., N. J., on the Delaware and Raritan canal, near the Millstone river, and on a branch of the Pennsylvania railroad; 10 miles N. E. of Trenton. It contains waterworks, gas and electric lights, National, State, and savings banks, and weekly newspapers. Princeton is chiefly known as the seat of the College of New Jersey, officially called PRINCETON UNIVERSITY (*q. v.*). The battle of Princeton took place at the bridge on Stony Brook, about 3 miles W. of the town. During the engagement, which was very severe, General Mercer fell mortally wounded. The action resulted in a decisive victory for the Continental army. The British lost nearly 200 in killed and wounded, and 230 captured. The American loss was about 37. After his retirement ex-President Cleveland made his home in Princeton. Pop. (1890) 3,422; (1900) 3,899; (1910) 5,136.

Princeton Theological Seminary, an educational institution in Princeton, N. J.; founded in 1812, under the auspices of the Presbyterian Church; has endowment, \$3,225,000; grounds and buildings valued at over \$550,000; volumes in the library, about 85,000; ordinary income, \$145,000; average number of faculty, 16; average students, 160; graduates, 5,700.

Princeton University, an educational institution in Princeton, N. J. It was founded Oct. 22, 1746, by a charter given under the seal of the Province of New Jersey, "for the instruction of youth in the learned languages and in the liberal arts and sciences." On Sept. 14, 1748, a more ample charter was granted by King George II., establishing the corporation under the name of the College of New Jersey; and providing that the management of its affairs should be in the hands of 23 trustees (later changed to 27). Among these were the governor of New Jersey, Aaron Burr, Samuel Blair, and David Green, names that have ever since been identified with the history of the college. After the War of the Revolution the royal charter was confirmed and renewed by the Legislature of New Jersey. In May, 1747, the College of New Jersey was officially opened at Elizabethtown (now Elizabeth), and the same year was moved to Newark. Soon after

Princeton University

it was again moved to Princeton, where in 1754 the first college building, Nassau Hall (so named in memory of King William III. of the house of Nassau), was erected.

The college suffered severely during the Revolutionary War, the main building being used as a barrack by both American and British troops (see PRINCETON). Its president, Dr. Witherspoon, and two of its alumni, Richard Stockton and Benjamin Rush, were signers of the Declaration of Independence. In 1783 the Continental Congress and General Washington were present at the commencement exercises, Washington presenting 50 guineas to the college. This sum was appropriated by the trustees to the painting of a picture of Washington by the elder Peale. It now hangs in Nassau Hall, and is considered one of the best extant pictures of him. In 1802, and again in 1855, the hall was partly destroyed by fire. After the Civil War the college began to make rapid progress. The number of students increased, the faculty was enlarged, and in 1872 the Chancellor Green Library (named in honor of its donor) was erected. Up to this time the course of instruction had led exclusively to the degree of Bachelor of Arts; but in 1873 the John C. Green School of Science was added, and in 1875 the Department of Civil Engineering was also created. In 1889 the Department of Electrical Engineering was founded, and in 1901 the Graduate School was formally established, Prof. Andrew West being appointed its dean.

On Oct. 22, 1896, the 150th anniversary of the signing of the first charter, the title of Princeton University was assumed. In 1897 the Chancellor Green Library was connected with a new library building, having a capacity to shelve 1,200,000 volumes. The total number of buildings now belonging to the university is over 40, among them being the Halsted Observatory, with an instrument of 23 inches aperture and 30 feet focal length; Alexander Hall, with a seating capacity of 1,500; Marquand Chapel; Dickinson Hall, a building containing some 25 lecture and recitation rooms; the School of Science building, containing lecture rooms, physical laboratories, and the Museum of Biology; the Biological Laboratory; the Chemical Laboratory; the Art Museum; and a number of dormitories, among the more recent being Blair Hall, and Stafford Little Hall, donated respectively by John I. Blair and H. S. Little. In 1902 work was begun on the new gymnasium, to cost \$500,000, and on an extension of Stafford Little Hall.

Secret societies are prohibited at Princeton, but there are two strong literary societies, the Cliosophic and American Whig, founded before the Revolution, and having

Principal

valuable independent libraries. There are also two undergraduate religious societies, the Philadelphian (founded in 1825) and St. Paul's (founded in 1875).

The University has endowment funds of over \$4,175,000; grounds and buildings valued at over \$745,000; scientific apparatus, etc., \$140,000; volumes in the library, about 260,000; ordinary income, \$400,000; average number of faculty, 160; average student attendance, 1,400; graduates since opening, over 10,500. The total registration in 1911 broke all records, 1,442. Every State in the Union had at least one representative, and Brazil, China, Egypt, India, Korea, Syria, and Turkey had one each. The following is a list of the presidents from the beginning:

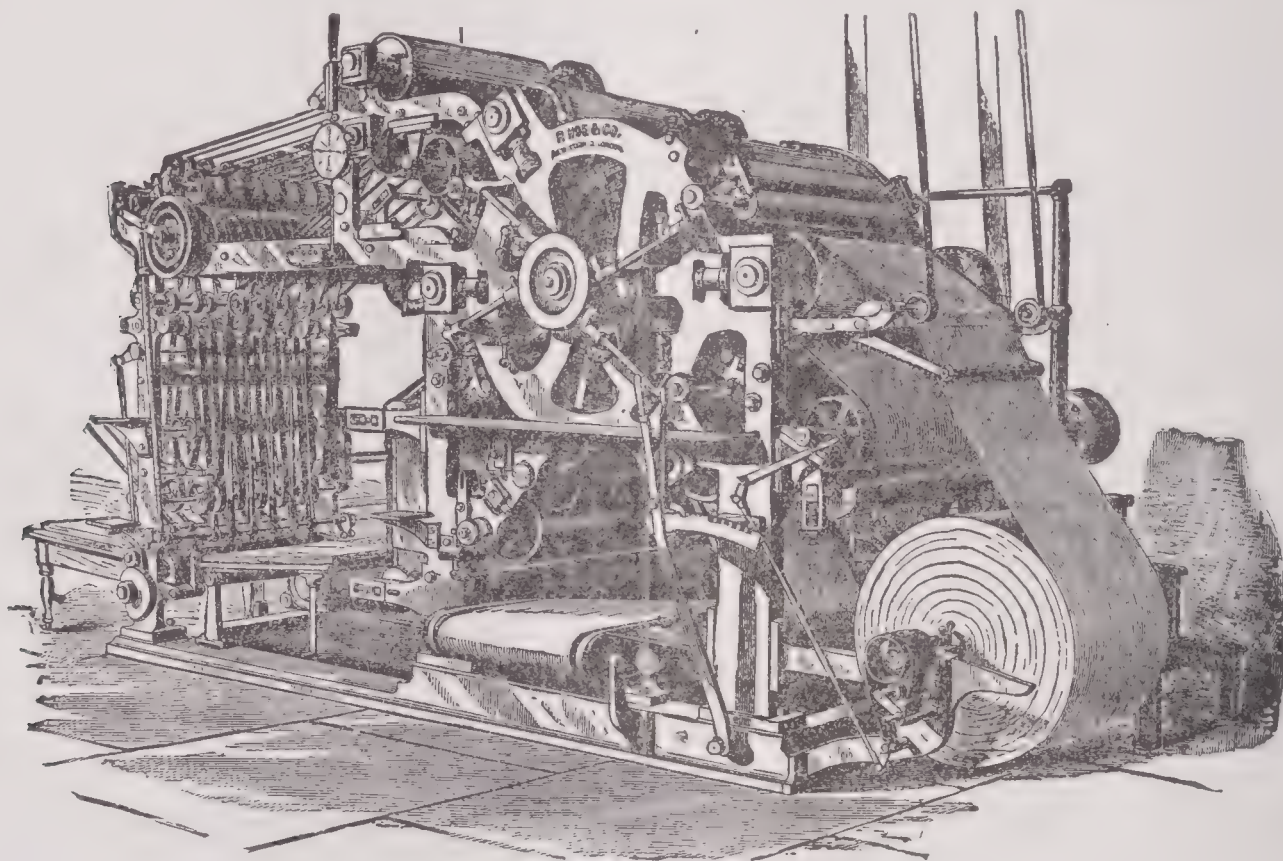
Rev. Jonathan Dickinson, 1747.
 Rev. Aaron Burr, 1748-1757.
 Rev. Jonathan Edwards, 1757-1758.
 Rev. Samuel Davies, 1759-1761.
 Samuel Finley, D.D., 1761-1766.
 John Witherspoon, 1768-1794.
 Samuel Stanhope Smith, 1795-1812.
 Ashbel Green, 1812-1822.
 James Carnahan, 1823-1854.
 John Maclean, 1854-1868.
 James McCosh, 1868-1883.
 Francis Landey Patton, 1883-1902.
 Woodrow Wilson, 1902-1910.
 John Aikman Stewart, acting, 1910-

Principal and Agent, a designation in law, applied to the legal relationship existing between one person and another acting for him. There are special rules of law applicable to such a relationship, the most important of which are indicated under **AGENT** (*q. v.*).

Pringle

Principe, Miguel Agustin (prēn'thē-pā), a Spanish writer; born in Caspa, Spain, in 1811. He was at one time Professor of Literature and History at the University of Saragossa, and afterward connected with the Royal Library of Madrid. He wrote a "History of the War of Independence"; "Verses, Serious and Gay"; the three dramas "Count Julian," "Cerdan, Judge of Aragon," and "Mauregato," as well as several comedies, among them "Periquito" and "The House of Pero Hernandez."

Pringle, Thomas, an English poet; born in Blaiklaw, Roxburghshire, Jan. 5, 1789. Lame from childhood, dyspeptic, devout, he went at 17 to Edinburgh University, and found bread, if not contentment of mind,



PERFECTING WEB PRESS.

as clerk in the Scotch Public Records Office. He took to writing at an early age, and, besides other literary schemes and ventures, started the "Edinburgh Monthly Magazine," the parent of "Blackwood," in which his own most important article was on the gypsies, from notes supplied by Scott. In 1820 he set sail with a party of 24 emigrants of his father's family for Cape Colony. He traveled into the interior with the party, and had his heart stirred within him to see the inhumanity practised toward the natives by English and Dutch residents alike. For three years he lived at Cape Town as librarian of the government library at a salary of \$375 a year. He started the "South African Journal," and fought a brave fight for the freedom of the press. But he was bullied by the tyrannical and petty-minded governor of the day, Lord

Printing

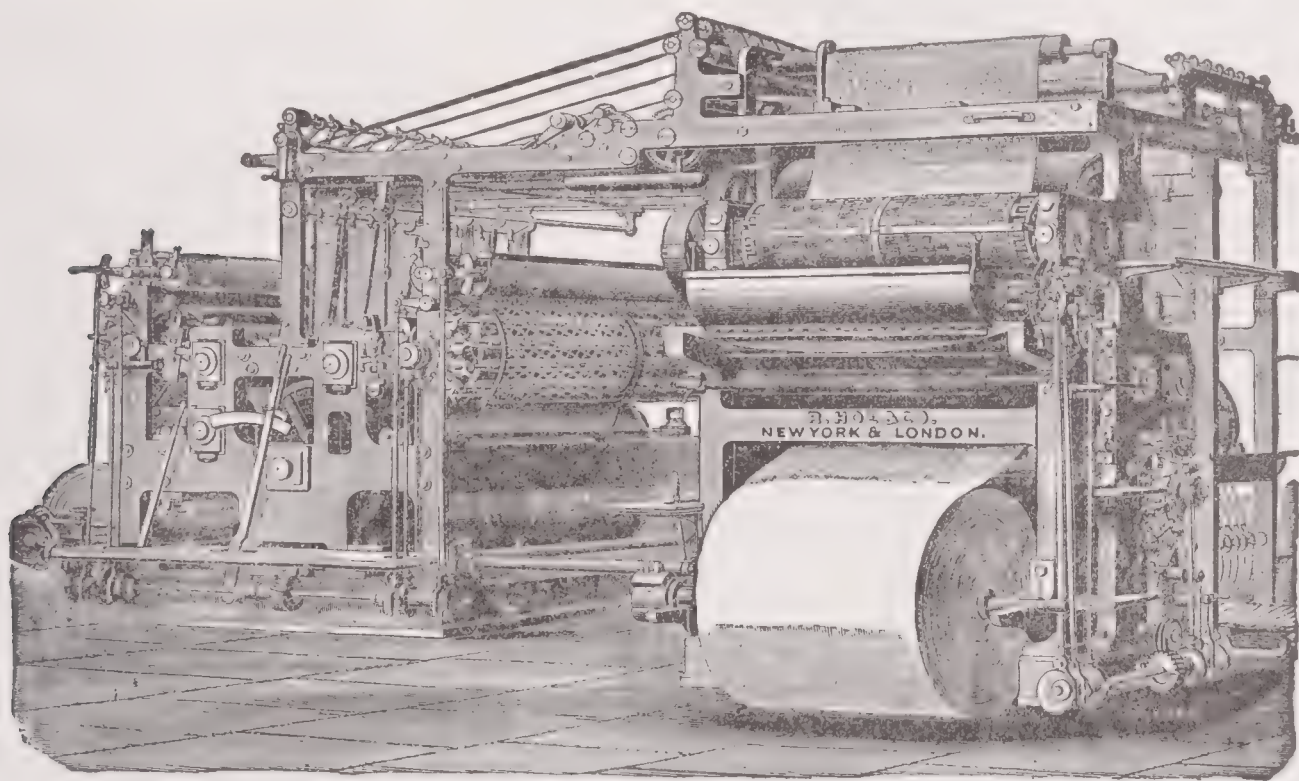
Charles Somerset, his schemes crushed, and himself reduced to poverty. He returned to London in 1826, and became secretary of the Anti-Slavery Society. His "Ephemerides" (1828), was a collection of graceful verse. Those poems that related to South Africa—the best "Afar in the Desert"—were reprinted in the volume of "African Sketches" (1834), a series of glowing sketches of South African scenery. Pringle's "Poetical Works" were edited, with a florid eulogium, rather than a life, by Leitch Ritchie (1839). He died in London, Dec. 5, 1834.

Printing, the art of producing impressions from characters or figures on paper or any other substance. Printing is of comparatively modern origin, only 400 years having elapsed since the first book was is-

Printing

the first book printed by it in the New World was "The Ladder de S. Juan Climaco" (1536). The earliest press in the British-American colonies was brought over for Harvard College in 1638, and was set up by Stephen Daye. The "Bay Psalm Book" (1640) was its first important work; but in 1639 it printed the "Freeman's Oath" and an almanac. In Philadelphia a press was set up in 1685, in New York in 1693.

The earliest improvement on the printing press was made by the celebrated Earl Stanhope, who constructed a press of iron of sufficient size to print a whole surface of a sheet. A multitude of improvements speedily succeeded this press in most of which the screw was dismissed, the pressure being generally effected by levers, or by the simple and efficient principle of straightening



PRINTING PRESS.

sued from the press; yet we have proof that the principles on which it was ultimately developed existed among the ancient Assyrian nations. Printing from movable types was, according to Professor Douglas, probably practised in China as early as the 12th or 13th century, as there are Korean books printed from movable clay or wooden types in 1317. The great discovery was that of forming every letter or character of the alphabet separately, so as to be capable of rearrangement and forming in succession the pages of a work, thereby avoiding the labor of cutting new blocks of types for every page. The credit of inventing this simple yet marvelous art is contested by the Dutch and Germans. Printing was brought to England in 1476 or 1477 by William Caxton. The first printing press set up in America was introduced by the Viceroy of Mexico, Antonio de Mendoza, and

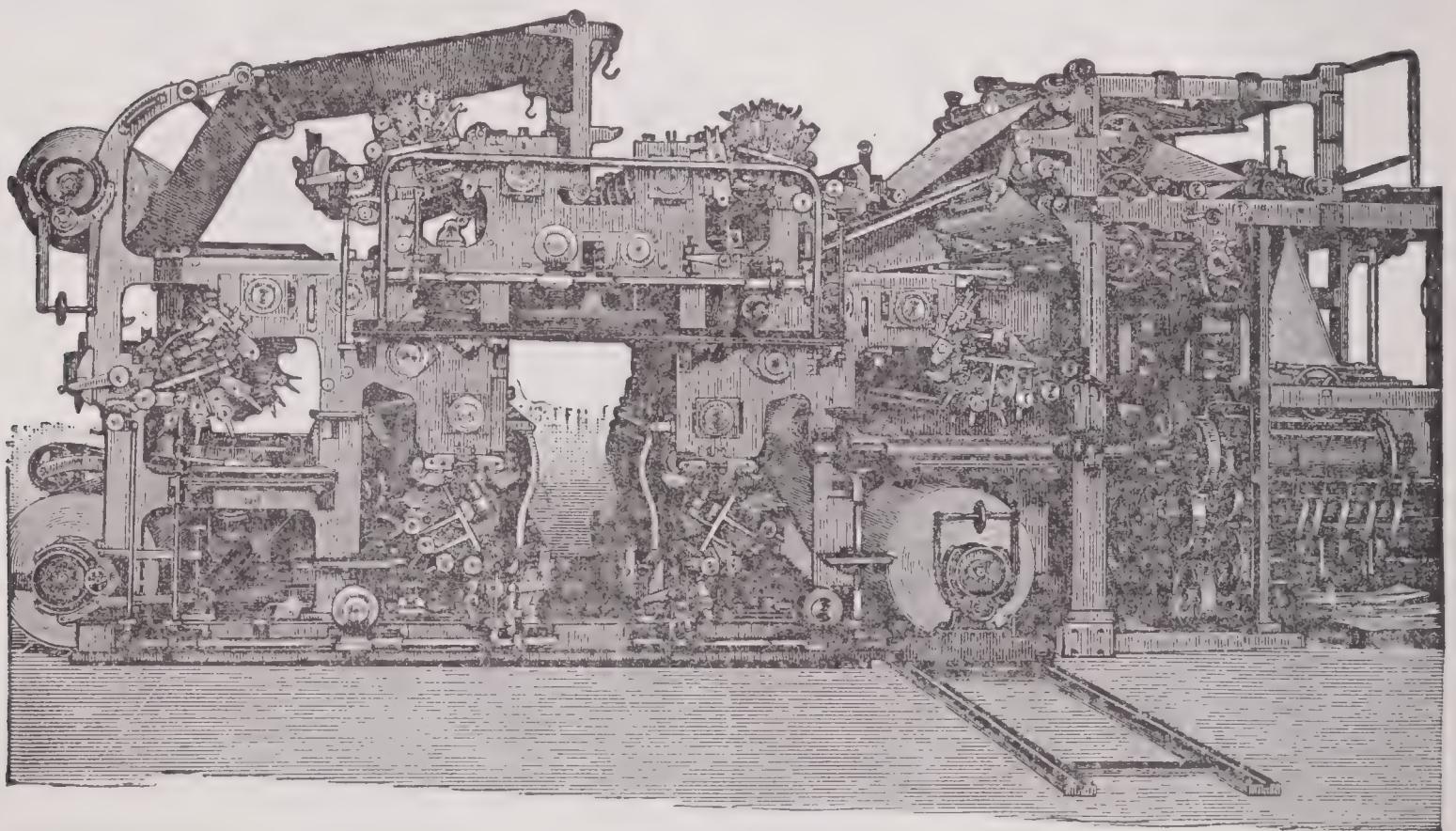
a joint. Among those which gained a large share of approbation was the Columbian press, which was of American invention. This press was taken to Great Britain in 1818 by George Clymer, of Philadelphia, and patented. The pressing-power in this instance was procured by a long bar or handle acting upon a combination of exceedingly powerful levers. To secure good printing the following points are essential: (1) The types, carefully set, fixed with precision in forms, rendered properly level all over, so that all parts may be pressed alike, and the whole properly cleaned by a wash of potash lye; (2) a uniform inking of the surface, to give uniformity of color; (3) the paper dampened equally so as to take an impression easily and evenly; (4) an equal, firm, and smart pressure, and with that degree of steadiness in the mechanism that the sheet shall touch and leave the types

Printing

without shaking and blurring; (5) care in adjusting the pointers (or gauge), so that perfect register may be secured in printing the second side; (6) such frequency in changing fly or under-sheets on the tympan that the first side shall not get soiled by off-setting when printing the second side; (7) the laying of small patches on the tympan where, from an inequality, it seems necessary to bring up the pressing surface to a thorough equality. Printing is now executed by one or other of the varieties of cylinder presses, moved generally by steam. Cylinder printing is the great modern factor in the history of the art, progress in which department has been helped by the invention of inking rollers made of a certain composition, to supersede the old proc-

Printing

vented by G. P. Gordon, about 1868. Larger work is done on machines having one or two cylinders. Those of the "Wharfedale" pattern, invented about 1860 by William Dawson and David Payne, of Otley, Wharfedale, York, England, have one cylinder, and print only one side of the paper at a time. It has been found, since machines have been brought to their present degree of perfection, that they give far superior results to those from presses—their impression is stronger, more solid, and more uniform, and the sheets can be laid on them with a precision unattainable with hand-presses. Paper is not now made spongy and stretchable by being wetted, and the result of working it dry is that the type is brought up with greater brightness, and the



HOE ROTARY PRINTING PRESS.

ess of inking stuffed balls. Printing machines may be divided into two distinct classes—those for printing books, in which accurate register is required, and those for printing newspapers, in which register is not sought for, and speed is of first consequence.

The printing business is divided into three departments—those concerned respectively with jobbing or commercial work, with book work, and with news work. The character of ordinary jobbing work has been bettered by the liberal use and correct selection of colors, by the introduction of ground tints, and by the artistic taste infused into the design. The type foundry has provided the printer with more beautiful types and more diversified ornaments. Jobbing work is chiefly done on small platen machines in-

delicate lines of engravings are printed finer, clearer, and cleaner. Improvements in ink-making have also conduced to this desirable result. Paper has been produced for book printing with a specially prepared surface. The soft blanket has been discarded, and the packing or covering of the cylinder is now generally hard. The aggregate results of these alterations may be seen by a comparison of the present issues of an illustrated newspaper with those of 50 years ago. Up to about 1840 there was actually no press strong enough properly to print a woodcut of 48 square inches in superficies; now woodcuts of 2,000 square inches, or 50 inches by 40, are printed in the most perfect manner. The colored supplements of the pictorial journals are often admirable reproductions of works of high art. A single

color press built in 1898 contained between 50,000 and 60,000 individual parts.

Books are generally printed in sheets of 16 pages, or multiples of 16 (32, 64, 128); in the latter case they are cut into sheets of 16 after being printed. In making up the pages to print a 16-page sheet, two forms, as the chases containing the type are called, are required, one for each side of the sheet. If a printed sheet of 16 pages be opened out, the pages will be seen to be arranged in the following order:

4	10	11	9
2	15	14	3

9	21	6	8
4	13	16	1

And the pages in the chase must be so arranged, or "imposed," as it is called, that when printed, they will so appear. When ready for printing or stereotyping, as the case may be, another proof is read for final correction. In some cases where great accuracy is required, such as in the present work, as many as six or eight proofs are "read" at different stages. When the types have been printed or electrotyped and returned to the case room they are distributed by the compositors into the cases again for further use; and this can be done with wonderful rapidity, though great care must be used to avoid putting the letters in the wrong boxes. Several very ingenious machines have been invented for setting type which have been more or less successful. They are worked something after the manner of type-writing machines. Several of the latest of these cast and set the type by one movement. This saves the labor of redistributing the types, as when done with they are melted again.

The latest and largest achievement in printing machines is the combination color octuple rotary perfecting press. It has four paper rolls, each four pages wide, and is really a combination of five-cylinder color press and a regular sextuple (or three roll) machine, either of which may run independently of the other. Four-roller distribution on the color portion insures fine work, and special oil-fountain arrangements take care of the offset. The printing is done from both stereotype and electrotype plates. The cylinders are made to take on the regular thickness of stereotype plate (7-16 inch), and when running with electrotype plates (1/4-inch thick), the difference in thickness is made up by fastening brass jackets to the cylinders. The press is arranged to run at various speeds, according to the quality of printing desired, and gives many combinations not mentioned above, both of full newspaper size and half page (or magazine) forms, with the rate of 48,000 16-

paged papers per hour, all inserted, pasted, cut, and folded with the cover pages printed in four colors. The combination half-tone and color pictorial electrotype perfecting press is designed especially for printing, from electrotype plates, high-grade periodical work, with half-tone and color illustrations. It gives two colors on half the number of pages of all products. The sheets are associated in such a manner that the two outside and center pages are always in two printings.

Capital Invested in Printing.—In July, 1902, the Census Bureau issued a report on printing and publishing which shows a capital of \$292,517,072 invested in the 22,312 establishments reporting for the industry. The value of the products is returned at \$347,055,050, to produce which involved an outlay of \$35,090,719 for salaries of officials, clerks, etc.; \$84,249,889 for wages; \$55,897,529 for miscellaneous expenses and \$86,856,290 for material used. The report says that when the two branches of the industry are separated—as far as the separation of products so closely related is possible—the total value of all book and job printing products is about equal to the total value of all distinctive newspaper products; the former, including the printing and publishing of music, being \$168,930,707, or 48.7 per cent. of the total and the latter \$175,689,610, or 50.7 per cent. of the total. The capital invested in both branches of this industry showed a marked increase, while the value of products per establishment declined. The number of establishments in the newspaper and periodical branches, proportionately 83 to every 100 publications in 1890, remained nearly stationary in 1900, being 84 to every 100 publications. Of all newspaper and periodical establishments 63.3 per cent. were owned by individuals, 19.7 per cent. in partnership and only 17 per cent. by corporations, indicating that combinations of any consequence are unlikely in this industry. The total number of wage earners increased only 10 per cent., but the value of products earned by them increased 24 per cent. Of the total value of products, advertising formed 43 per cent. subscriptions and sales 35.8 per cent., and book and job printing, including miscellaneous products, 21.2 per cent. The proportion of subscriptions and sales steadily declined from 1880, while the proportion which advertising formed steadily increased.

In 1890 the increase in the number of all publications was greater than the increase in population, but in 1900 the increase in number of publications and in population was about the same. During the decade there was an increase in the proportion of daily, tri-weekly, semi-weekly and monthly publications; a marked decline in the proportion of publications devoted to special

topics and an advance only in the classes devoted to news topics and to general reading. The total circulation per issue of dailies was enough to supply one for every five inhabitants. The total circulation per issue of weeklies and monthlies was one to two inhabitants. Publications printed in English formed 94.3 per cent. of all publications reporting for 1900, showing a considerable increase over the corresponding figures for the preceding decade. One and one-quarter billion pounds of paper were used during the census year. Of this amount 77.6 per cent. was consumed for newspapers, 16.4 per cent. for books and periodicals and 6 per cent. for job printing, but the proportionate cost was 58.7 per cent., 24.7 per cent., and 16.6 per cent., respectively. Daily evening newspapers increased more rapidly than daily morning papers. In 1890 there were two evening papers to every morning paper; in 1900 the proportion was about three to one.

Ten leading States supplied four-fifths of the circulation per issue of all publications. Weekly publications were more numerous in proportion to inhabitants in the West and Northwest. New England ranked high in dailies but low in weeklies, suggesting that in that densely settled region the daily had to some extent supplanted the weekly. New York, New Jersey, and Pennsylvania show the most striking advance in the proportion of the total circulation reported. There were 15 different languages or combinations of languages represented in 1880, 30 in 1890 and 25 in 1900. The principal languages in which increases in the number of periodicals published were shown in 1900 were English, Bohemian, Hebrew, Italian, Polish, Scandinavian and Spanish. Decreases were shown in the number of periodicals published in Dutch, French and German. The languages represented by publications in 1880 or 1890 but not in 1900 were Armenian, Catalen, Gaelic, Irish, "Volapuk" and Welsh. New York city, with a population of 3,437,202, had 58 papers, 29 of which are morning and 29 evening, the aggregate circulation per issue being 2,732,089, and the number of inhabitants to each copy per issue being 1.26.

Printing by Electricity. It is certainly surprising to note to what extent electricity is now used in the leading printing establishments of this country, as well as in Europe. It is with a deep feeling of pleasure that one steps from the old-fashioned belt-driven pressroom into the modern, clean, bright, well-lighted, motor-driven pressroom of an up-to-date printing plant. The dark, ill smelling, poorly ventilated, dingy basement printing shop is now radically changed, it being noted that electricity has been the wonder worker, and is now supplying current for lighting the various departments with brilliant arc and incandes-

cent lamps. The foul odors are dissipated and driven out of the workrooms by powerful electric fans and motor-driven exhaust blowers; the fast flying belts which endanger life and limb, with the numerous countershafts and pulleys, have disappeared, and in their place are to be found separate motor-driven machines of every type and kind known to the modern printing trade. In the typesetting room the electric motor is geared to the linotype machine, and the composition is accomplished with great accuracy and dispatch; the type-casting machines are operated by dust-proof electric motors, and direct-connected routers and metal saws are at work, saving power and economizing space and increasing the product in a given time. The electroplating branch has always been an important application of electricity in the printing industry. In the pressroom the motors are connected to the various machines either by belting, by gears, or by being directly connected to the press, the latter being accomplished in many cases by simply removing the tight and loose pulleys, which were used for driving by belts from the main shafting, the motor simply being substituted. The advantages of direct connection are many, including noiseless running, simplicity of construction, reduction of losses from friction, and slippage of belts, while the space in the pressroom required is less and the life of the motor is greatly increased, largely due to its slow speed. The automatic folders are frequently driven by the electric current, and the modern paper cutter is also operated in this way with great reliability and safety, it being possible to stop the cutting machine instantly if desired. In the binding department there is probably as great a field for the electrically-driven machine as any in the entire printing establishment. The embossing presses of the latest types, as well as the binding machinery, cutting machines, stitching machines, and graining machines, are electrically driven, producing a great saving in power, which is used only in proportion to the work done. It is not necessary to supply power for the whole plant when only one or more machines are working, as the moment the operator breaks the circuit the motor stops and all of the expense immediately drops off. With shafts, pulleys, and belting this is not the case, as there is a continual loss due to the friction in operation of same when there is no load, and the losses due to slip of belt are continually varying from month to month, due to variation of tightness of belt, arc of contact, and smoothness of the pulley faces. On account of the settling of floors and walls, the line shafting is bound to get out of alignment more or less, which also is a great source of loss. The entire belt transmission system is continual-

Printing by Electricity

ly becoming clogged and covered with dirt, grease, and flying dust, while the motor-driven machines result in greater cleanliness, a saving in the cost of insurance on account of decreased danger from fire, and a greater amount of light, due to the entire absence of these overhead obstructions. Electric heaters are now being installed in many binderies, and electric motors can be adopted with great economy and many advantages by every printing establishment in the country, and there are a large number now fully equipped with this system of driving. The work of the printing press is bound to be more or less intermittent, which always results in a saving in motor-driven machinery, this being largely due in this class of work on account of the necessity for stopping to "make ready." It is also true that for the preliminary impressions the press must be run very slowly, and frequently started and stopped, and this cannot be so well accomplished by mechanical drive, though later the speed may be increased to a maximum limit, turning off thousands of impressions in a short time.

The Bureau of Engraving and Printing at Washington, D. C., is thoroughly equipped with electrically-driven machines operated by General Electric motors; and many of the leading newspapers and magazines have had their plants equipped with Lundell, Northern and Bullock machines, these types of motors having been extensively used for direct connection, as well as by gearing and belt driving, to most of the high-grade presses, cutting machines, routers, stitching machines, and other devices used in an up-to-date printing establishment. It is not always the high speed of a press which produces the greatest amount of work, but the one which can be kept operating continuously at a comparatively rapid rate without a great number of stoppages from various difficulties and a great amount of time being lost.

The breaking of belts and other faults due to bad power transmission causing delays require a greater speed from the press to make up, while a moderate speed under continual operation means greater economy, increased output, and less wear on the machinery. It is very easy in many cases to equip an old printing establishment with electrically-driven presses without discarding existing valuable apparatus. In these cases it is found very convenient and desirable to use a short, endless belt to connect the motor with the press, the standard press pulley being used, and no changes are required on the press. This method frequently allows placing the motor under the press, and no valuable space is thus occupied. The geared outfits and direct-connected outfits are, of course, the most substantial, the latter being really the ideal method, though the cost is considerably higher,

Printing in the 19th Century

as very slow speed motors are required. The direct-connected outfits have the armature of the motor attached directly to the driving shaft of the press without the interposition of gears or other transmitting mediums. The armature must therefore run at the required speed of the press shaft, which is usually very much lower than that of the ordinary electric motor. The first cost of the motors for the geared and belted outfits is much lower than the direct-connected type, and the first cost of electrically operating with any type of motor is of course more than the old belting and shafting transmission. The advantages to be gained by the former over the latter, even at the added cost, are well worth the increased expense, on account of the saving of the great friction losses, economy of floor space, noiseless running and greater reliability and safety. The cost of equipping a printing plant is greater, as the use of the booster teaser, in addition to the motor, increases the expense of the electrical machinery by that amount; but as in the case of the advantages of the direct-connected, slow-speed motor over the high-speed belted or geared motor, the increased first cost is more than made up in the saving in current and other features.

Printing in the 19th Century. Books printed in 1801 cannot be commended as better than those printed in 1501, for there had been no improvement in master printers and few changes in the old methods. The hand press, said to have been improved by Blaeu of Amsterdam in 1601, was left by him about as slow as it was in the days of Aldus and Stephens. Its frame and platen were of wood, and its bed rest for type was of stone. One pressman inked the type with a pair of leather balls, and was followed by another who pulled the bar four times to print on both sides a sheet seldom larger than 19 x 24 inches. By hard labor the press could be made to produce 700 small sheets (requiring 2,800 pulls of the bar) in 10 hours, but the average performance was less. Paper made by hand seldom exceeded the size of 22 x 28 inches. Printers and readers had reason to complain of its coarseness, greyness, uneven thickness, and sophisticated manufacture. Types, not well graded as to size, and of few varieties but often of good design, were cast by hand at the rate of 200 or 300 an hour. All work was by hand, but hand work did not imply excellence. When the workman was an expert and loved his work and had been provided with good materials, and was allowed time for its accomplishment, his workmanship was excellent; but these conditions seldom were combined. The typography of the ordinary book or newspaper of 1801 is not work to be proud of.

In 1794 Burke estimated the total number of readers in England at 80,000. This

was not enough to justify expensive improvements in the mechanics of an art which had been persistently vexed with hostile legislation. The decree of the Star Chamber in 1637, which limited the number of English printers, did not check the growth of printing more effectually than the stamp duty of fourpence levied in 1815 on every English newspaper. Printers everywhere had to encounter disabilities made by society as well as by law. Even in America, Franklin's brother was practically boycotted in Boston, Bradford had to leave Philadelphia for New York, and Zenger of New York had to stand trial for criminal libel in making proper comment. At an earlier date Governor Berkeley of Virginia thanked God that there were no printers in that colony and hoped that there would be none. Printers had to be content with conditions as they were. They had little inducement to improve their workmanship or to extend their field of activity.

Yet among the critical there was dissatisfaction at mean printing. As early as 1733 Pyne, vexed at the meanness of English typography, had two volumes of Vergil engraved and printed by copperplate process, which gave him clearer letters, blacker ink, and better decoration. Between 1791 and 1793 English authors had books printed by Bodoni at Parma, who made them in a style then unapproachable in England. Bewick of Newcastle was then engraving woodcuts that could not be fairly printed on the hand press. Ged and Tilloch of Edinburgh were vainly trying to introduce the art of stereotyping. William Nicholson of London tried to improve the press, and took out a patent in 1790 for these improvements: (1) tapering types that could be fastened on a cylinder; (2) cylindrical inking rollers of leather; (3) two cylinders working concurrently and printing a sheet of paper passed between them; but he did not perfect any one of these devices.

The first noticeable improvement was made by Earl Stanhope, who in 1798 invented a hand press entirely of iron which could properly print one side of a large sheet by one impression. The mechanism was entirely his own, but the practicability of a large platen for the printing of one side of a sheet had been demonstrated by M. Pierres of Paris as early as 1786. The iron press lightened labor, but it did not increase production, which was sorely needed. In 1804 König of Saxony went to London with the model of an improved platen press intended to be self-inking, and to more than double the performance of the old hand press. After many years of experiment he had to abandon all efforts to improve the old method of printing from two flat surfaces, but he was entirely successful in his method of printing upon a flat surface from

a rotating cylinder. The machine so constructed was fairly tested on a book form in 1811, and was put to regular use on the London "Times" in 1814. This machine was a turning point in printing, for it demonstrated the greater speed and merit of the cylinder movement. König had been materially helped in his experiments by many English inventors who developed his imperfect plans—of whom Bensley and Napier most deserve notice. The König and Bensley machine which printed one side only of the sheet, was followed after a while by the double cylinder, which printed on the forward and the return movement of the form at the rate of 1,500 or 1,800 perfect copies in an hour, as well as on either side of the sheet, and with this performance newspapers had to be content for many years.

Improvements in printing machinery would have been relatively ineffective if paper had not been provided in larger sheets, of uniform thickness, and at lower price. In 1799 Louis Robert of France, aided by Leger St. Didot, invented a machine for making paper in a continuous web. After the expenditure of much money in correcting its imperfections, the brothers H. and S. Fourdrinier of London made the machine practicable in 1805, and it has ever since been used and known as the Fourdrinier machine. Its introduction was strongly resisted by the workmen, who magnified its defects. It was not until 1827 that it was introduced in the United States. At that time and for many years afterward printing paper was made almost exclusively of cotton fiber. When the supply of rags was not equal to the demand, straw and fibrous grasses proved fair substitutes. In 1860 Henry Voelter invented an apparatus for grinding soft woods like pine and hemlock into a pulp, from which paper was easily made. Between 1853 and 1858 many new methods were introduced of making paper stock from chipped wood treated with acids or alkalis. Under the new treatment paper is made with longer fibers and of better quality, and the cost of manufacture has been largely reduced. The high speed maintained on machines by all newspapers of large circulation depends quite as much on cheap paper and a continuous web as on improved machinery for presswork.

Fast printing machinery would have been impracticable without cylindrical inking rollers made of glue and molasses, a material which had been used in the Staffordshire potteries for many years. Its adaptability for receiving and imparting ink or color was perceived by some unknown English printer, who induced the makers of cylinder presses to try the novel compound. as rollers of leather and india-rubber had been found ineffective. Without the swift-moving composition roller there could be no

inking of type on fast machines. It was the slow, dabbing movement of the old inking ball that made König fail in all attempts to quicken the hand press and his first cylinder machine.

Another contribution to the development of book printing was the art of stereotype, made practicable by Earl Stanhope about 1804. Under the old conditions a publisher did not dare to print a large number of copies of any book unless he believed it would have quick sale. Books were bulky, and took up too much space. Consequently the types for a first edition were distributed when they left the press; they had to be reset, with renewed chances of error in the second edition. Resetting for two or more editions added largely to the cost of the book and limited its supply. The process first used, known as the plaster process, served book printers fairly for types for about 50 years, but it failed for engravings, and was too slow and troublesome for daily newspapers. The practice of the art was brought to New York by David Bruce in 1813, but the first book stereotyped in America was the "Westminster Catechism," made by J. Watts and Company of New York in June of the same year. The clay process of stereotyping, ruder but quicker and cheaper, met with small favor. The *papier-maché* process, invented by Genoux of France in 1829, by which a mold of the type can be taken on prepared paper, is the process now preferred by all newspapers, but they refused it for many years. For the printing of books, all methods of stereotyping have been superseded by the more recent art of electrotyping, which was experimentally tried in New York as early as 1841 by Professor Mapes, and was in general use in that city before 1855.

Though important improvements in printing machinery were first made in England, English machines and indeed those of other European countries, have never been common in the United States. The productions of American builders of presses and founders of type are preferred at higher prices because they have been made to meet local requirements. Much of American invention is based on new principles. After König's failure to make a quicker platen press, foreign inventors gave up the platen movement as impracticable, but Isaac Adams of Boston took it up from a new point of departure and made it successful. In 1827 he constructed the machine now known as the Adams power press. As first made it was a rude affair, with frame of wood, and fitted for sheets of small size, but it was afterward made of iron entirely and enlarged and improved so that it could print a sheet, on one side only, of 30x40 inches, at the rate of 800 sheets an hour. Considering the larger surface printed, as well as its greater speed, the improved Adams press

did in one day the work of 10 hand presses quite as well as it had been done before, for its provisions for inking and exact register were of the best. For more than 50 years it was the machine preferred for book printing. Nor is it yet out of fashion. The Riverside Press has a large number in daily use. As cylinder machines had been found indispensable in the printing of newspapers, they were exclusively used in every large city for that purpose. Book printers did not like them, for as first made, after early patterns, they wore type badly. The American Bible Society tried to utilize the cylinder for printing Bibles, but had to put them aside as too destructive to type. Daniel Fanshaw was equally unsuccessful. Pressmen stigmatized the cylinders as the "type smashers," and those that I saw in 1849 in some printing houses of that city fairly deserved the name. In 1835 Harper and Brothers printed all their books on hand presses, for they had no machines of any kind. The New York "Sun" was first printed on the hand press. Two or three men working strenuously in reliefs of 15 minutes, were able to print about 400 or 500 sheets in an hour on one side only. Greater production was impossible. As late as 1849 the firm of Banks and Gould printed all its law books on the hand press, but this was the last attempt in New York city to employ it for commercial book work.

All New York daily newspapers before 1850, of the class of the "Evening Post" or the "Courier and Enquirer," were large sheets of four pages only, for it was then better to have four large than eight smaller pages. Though the double cylinder perfecting press, which printed on two sides at one operation, was then known and used, two cylinder presses were sometimes required—one to print one side and another to print the reverse side of the sheet. When each machine had quick feeders it was possible for the two to produce 3,500 impressions in an hour, but the average performance was not so large. This product was too small for any paper with increasing circulation. Forms had to go to press early, to the shutting out of news, and finish late, to the annoyance of subscribers. The old morning paper pressroom was a Babel of confusion, for the work of printing was seriously impeded by feeders and paper folders.

A successful attempt to increase production was that of R. Hoe and Company, who in 1847 invented a rotary press with four-impression cylinders, which turned out four papers, printed on one side, at every revolution of the central cylinder that contained the form of type. The secure fastening of movable type on the curved surface of the central cylinder was accomplished by a simple and effective method. Machines with six, eight and ten-impression cylinders

were afterward made, which produced from 5,000 to 12,000 impressions in an hour. Each cylinder required a separate feeder. For many years this press had great popularity. First used on the Philadelphia "Ledger" in 1847, it soon found its way to New York, London, and Paris. Though it increased performance largely it did not overcome all the difficulties. A second rotary machine was needed to print the paper on the second side, and the folding had to be done by the old method.

In the first World's Fair, held at London in 1850, Thomas Nelson of Edinburgh exhibited as a mechanical toy (for he and the public regarded it as nothing better) a little cylinder printing machine, which printed at one operation, from an endless roll of paper, a small handbill on both sides. The feasibility of a larger machine was not appreciated by European press builders, but the principle was successfully utilized by William Bullock, who in 1865 was the first to make a machine which printed a large newspaper successfully on both sides of a continuous web of paper. This machine, which enabled the newspaper publisher to print 10,000 copies within an hour without the assistance of feeders, was regarded as a great improvement. Yet it had two serious defects, for it did not neatly deliver and could not fold the printed sheets. The defects noticeable in the Bullock press and in rival rotary machines then made by Walter of the London "Times" and by Marinoni of Paris, were fairly overcome in a new form of rotary machine first known as the web press, made by R. Hoe and Company, and first used by the "Tribune" in 1871, which printed from plates stereotyped in the curve at the rate of 10,000 or 12,000 copies in an hour, and piled the printed copies, counted, folded, and ready for delivery. Its high speed was not its only merit. Feed boys and fly boys, counters and folders were needed no more. When new machinery and improvements in the treatment of wood fiber warranted manufacturers in lowering the price of paper, publishers of newspapers began to issue supplements and double sheets. The old-time four-page paper sometimes appeared with a supplement of two pages, and then again as a double sheet of eight pages, and afterward, when paper had been further cheapened, in a combination (for Sunday editions) of three, four, or five sheets of eight pages each. To do this work properly the sheets had to be folded (sometimes pasted and folded), inserted in proper order and automatically counted. For the different requirements of an 8-page or a 40-page paper the web press had to be reconstructed again on new lines. Two or more machines feeding separate rolls of paper were geared together (sometimes at right angles to save room)

as one machine, but they kept time and pace exactly, and did perfect as well as rapid work. In this space it is not practicable to describe the quadruple, the sextuple, the octuple, and the six-color rotary printing machines made by R. Hoe and Company, which are now successfully at work in many cities, producing newspapers of few or many pages at speeds varying from 12,000 to 70,000 copies an hour. Machines of merit have been invented by other press builders. The last improvement in newspaper printing favors a great compactness and directness, as shown in the Goss (straight-line) machine, which prints from four distinct rolls of paper that send out separate sheets on parallel lines and unites them after cutting in folded copies.

The printing machines now most used for book and job work are much simpler, for they have been constructed to produce accurate more than rapid workmanship. The small machines respectively known as the Yankee card press, Ruggles job press, and Gordon press, made about 50 years ago for job printers, which printed petty work like cards, circulars, and handbills better than it could have been done on the hand press or the cylinder press then in use, were the simple models that compelled press builders to be more exact in the construction of cylinder presses for book work. To keep pace with these improvements the cylinder press of 1850 had to be reconstructed. Two new forms were made—the two-revolution cylinder and the stop-cylinder, the one last named the invention of Dutartre of France in 1852. On the two-revolution cylinder a performance of 1,500 to 1,800 impressions could be made in one hour; on the stop-cylinder of the same size, about 1,000 to 1,200 impressions an hour. When managed by an expert pressman the quality of the work done on these machines could be made equal and in some features superior to anything done on the Adams platen press.

In 1870 a great change took place in the methods of book printing. To receive a good impression from types it always had been thought necessary that paper be dampened and made pliable before printing. As an aid to this good impression an elastic woolen or india-rubber blanket was used for the impressing surface. When types only were printed the dampened paper and elastic impression made strong and easily readable print, but this method that was good for types was bad for woodcuts, in which shallow engraving was unavoidable. Elastic impression pressed surplus ink in the counters, or depressions, of the engravings, and seriously damaged the contrasts of light and shade made by the engraver. Printers of cards and circulars on dry and smooth paper had already proved that it was possible to print sharp lines clearly

without dampening the paper, and the printers of books, following this lead, began to use calendered paper and to print it dry with better effect on woodcuts. The new method of printing compelled much greater care in the adjustment of impression on the type and woodcuts, but it saved the expense of wetting the paper and of smoothing the sheets in the hydraulic press after impression.

In 1880 the recently discovered art of photo-engraving had been developed to such an extent that it was supplanting woodcuts as illustrations in pictorial magazines and books. The counters or depressed surfaces made by this process were so shallow that they could not be properly printed even on ordinary calendered paper. Paper makers removed this objection by covering a thin fabric of paper with a thick coat of whiting, which after repeated calendering left it with a surface as smooth as polished glass. On this coated paper it was possible for an expert pressman to bring out a delicacy from a relief plate almost equal to that made by photography or stipple engraving, and consequently coated paper has been the fabric most approved for the printing of fine illustrations. It was soon found that delicate lines and receding perspective were had at the expense of strength, for photo-engravings as first made were weak and monotonous. The engraver on wood, whose art was threatened with extinction, had to be recalled to burnish and touch up the weak spots of feeble half-tone plates. So treated, photo-engraving made merchantable illustrations. The value of this relatively new art in the reproduction of pen drawings, facsimiles of old prints, and writings cannot be overestimated.

In 1884 the circulation of illustrated magazines had increased so largely that it was impracticable to print them properly and in time on any form of flat-bed cylinder press. A new form of web press was made by R. Hoe and Company for the advertising forms and plain forms of the "Century Magazine," which printed them from curved electrotype plates and performed the work of 10 cylinder presses in an entirely satisfactory manner. The success of this machine led the same mechanics to make for the same periodical the rotary art press. This machine also prints, from curved plates, 64 pages of the magazine at each revolution quite as well as it had been done on the ordinary stop-cylinder. Though rotary machines have been found indispensable in newspaper offices that use only one size of paper, they have not been found generally useful in book printing houses, which have to print on many sizes of paper from different sizes and numbers of pages. The rotary press compels the use of a sheet (after it has been cut from the web) no longer or shorter than the

circumference of its cylinder. Nothing more seems to be needed in the speed of modern printing machinery, but improvements are needed in printing ink, printing paper, and improved methods of preparing type for printing.

Type-setting and type-making machinery received great improvements during the last half of the century. In 1853 William H. Mitchel invented a type-setting machine which was used for many years in the office of the late John F. Trow. It failed to meet general approval because of the inventor's inability to produce an equally good type-distributing machine. After Mitchel came no less than a score of inventors, who devised machines of greater or less merit. The machine most in favor at the present time, most largely used by newspapers, is the Mergenthaler or linotype which does the work of many men. Without this machine, which has cheapened type-setting, our newspapers could not afford to furnish so great an amount of reading matter.

During the last 10 years new fashions in typography have appeared. For more than 300 years each generation of printers followed more or less faithfully in the paths made by their predecessors, without attempting to create new forms of letters or new styles in typography. When Bodoni of Italy, at the close of the 18th century, made types with sharp lines, and when good French and English engravers began to imitate copperplate methods in woodcuts, every tendency toward a greater delicacy of print was sedulously cultivated by publishers, engravers and typefounders. This feminine style of typography reached its highest development in 1870. Then came the rebound. Not long after, Andrew Tuer of London began to reprint old English chapbooks that were noticeable for rudeness, blackness, and uncouthness. In 1890 William Morris of London established the Kelmscott Press for the reproduction of old books in mediæval style. He made for his exclusive use Roman and Gothic types of new forms and great blackness, which he graced with initials and borders after monastic designs. This revival of a thoroughly masculine style of typography had many features of high merit which were properly admired, but unfortunately it has met with imitators who copied its form and missed its spirit. Amateurs in typography have been encouraged to attempt imitations of coarse styles of printing done in the 16th and 17th centuries. Typefounders, following in their steps, have recently produced letters and decorations more uncouth than those of the printers of any age or country. The good models made by able men for four centuries have been supplanted for advertising purposes by the clumsy letters of schoolboys. This affectation of crude simplicity is but a passing fashion.

Prior

The 19th was a century of wonderful achievement in every branch of printing. The Fourdrinier paper-making machine, the Bruce type-caster, the linotype type-casting and type-setting machine, and other mechanical type-setters of merit; composition ink rollers, the cylinder press, the web press, and mechanisms of many kinds for the rapid printing of the smallest label or the largest sheet in black or many colors; machines for folding, sewing, and binding books; the art of stereotype, electrotype, and photo-engraving — all these are its outgrowth, and the more important have been invented or made practicable within the memory of men now living. It is a summary of which the printing trade may be proud. Printing was never done better and never done worse. It has never been furnished in so large a quantity at so small a price. For two or more cents can be had a newspaper with more reading matter than would fill a stout octavo volume. Yet books are made and sold in limited editions to eager subscribers at prices ranging from \$5 to \$50 a volume. William Morris maintained that printing had gone steadily from bad to worse till he revived its best features. Many publishers maintain, with more reason, that books of real value for instruction or amusement were never better fitted than they now are for usefulness to all classes of readers. THEODORE L. DEVINNE.

Prior, Matthew, an English poet; born in Wimborne-Minster, England, July 21, 1644; educated at Westminster School. He was graduated in 1686 at Cambridge and was soon after chosen fellow. In 1697 he was nominated secretary to the plenipotentiaries who concluded the peace of Ryswick, and on his return was made secretary to the Lord-Lieutenant of Ireland. In 1701 he entered Parliament as a Whig, but soon after changed his politics and joined the Tory party. He was excluded from office and employed himself in writing another volume of poems. In 1711, when the Tories again obtained the ascendancy, he was employed in secretly negotiating at Paris the terms of the treaty of Utrecht, and he remained in France till 1714, at first as secret agent, afterward as ambassador. On the accession of George I., Prior was recalled, examined, and kept in custody on a charge of high treason for two years, though ultimately discharged without trial. During his imprisonment he wrote "Alma, or the Progress of the Mind," which, together with his ambitious work, "Solomon," was published in 1718. He died in Wimpole, Sept. 18, 1721, and was buried in Westminster Abbey.

Priscillian, the founder of a sect in Spain, known as Priscillianists, in the middle of the 4th century, their most distinctive doctrine being the belief in an evil spirit

Prison

as the supreme power. His sect lasted till about A. D. 600.

Priscus. See TARQUINIUS, LUCIUS.

Prism, in geometry, a solid having similar and parallel bases, its sides forming similar parallelograms. The bases may be of any form, and this form (triangular, pentagonal, etc.) gives its name to the prism. In optics, any transparent medium comprised between plane faces, usually inclined to each other. The intersection of two inclined faces is called the edge of the prism, etc.; the inclination of the one to the other, the refracting angle. Every section perpendicular to the edge is called a principal section. The prism generally used for optical experiments is a right triangular one of glass, the principal section of which is a triangle. It is used to refract and disperse light, resolving it into the prismatic colors.

Prison, a place of detention for persons convicted of crime. In the early part of the 19th century the most advanced examples of prison discipline and construction were to be found in the United States. Following closely on Howard's report, the "Philadelphia Society for Assisting Distressed Prisoners" was founded in 1776 — the first of the kind in the world; and, though dissolved during the Revolutionary War, was reorganized in 1787, and is still at work. Large measures of reform were quickly secured; by 1790 the principle of separation was recognized, and in 1794 all convicts were separated and secluded; in the latter year, also, capital punishment was abolished in Pennsylvania for all crimes but murder in the first degree. It thus became necessary to devise some substitute for capital punishment. There are notably two systems of penitentiaries in the United States, each of which is claimed to be the best by its partisans — the Pennsylvania system and the New York system.

By the former, convicts are lodged in separate, well-lighted, and well-ventilated cells, where they are required to work during stated hours. During the whole time of their confinement they are never permitted to see or speak with each other. Their usual employments are shoemaking, weaving, winding yarn, picking wool, and such like business. The only punishment to which convicts are subject are the privation of food for short periods, and confinement without labor in dark but well-aired cells; this discipline has been found sufficient to keep perfect order; the whip and all other corporeal punishments are prohibited. The advantages of the plan are numerous. Men cannot long remain in solitude without labor; convicts, when deprived of it, ask it as a favor, and, in order to retain it, use, generally, their best exertions to do their work

well; being entirely secluded, they are of course unknown to their fellow prisoners, and can form no combination to escape while in prison, or associations to prey on society when they are out; being treated with kindness, and afforded books for their instruction and amusement, they become satisfied that society does not make war on them, and more disposed to return to it, which they are prevented from doing by the exposure of their fellow prisoners when in a strange place; the labor of the convicts tends greatly to defray the expenses of the prison. The disadvantages which were anticipated have been found to be groundless. Among these were that the prisoners would be unhealthy; experience has proved the contrary; that they would become insane; this has also been found to be otherwise; that solitude is incompatible with the performance of business; that obedience to the discipline of the prison could not be enforced. These, and all other objections to this system, are by its friends believed to be without force.

The New York system, adopted at Auburn, which was probably copied from the penitentiary of Ghent, in Belgium, called *La Maison de Force*, is founded on the system of isolation and separation, as well as that of Pennsylvania, but with this difference, that in the former the prisoners are confined to their separate cells during the night only; during the working hours of the daytime they labor together in workshops appropriated to their use. They eat their meals together, but in such a manner as not to be able to speak with each other. Silence is also imposed on them at their labor. They perform such labor as will not come into competition with "free" labor. The discipline of the prison is enforced by stripes, inflicted by the assistant keepers, on the backs of the prisoners; though this punishment is rarely exercised. The advantages of this plan are that the convicts are in solitary confinement during the night; that their labor by being joint, is more productive; that inasmuch as a clergyman is employed to preach to the prisoners, the system affords an opportunity for mental and moral improvement. Among the objections made to it are that the prisoners have opportunities of communicating with each other and of forming plans of escape, and, when they are out of prison, of associating together in consequence of their previous acquaintance, to the detriment of those who wish to return to virtue, and to the danger of the public, that the discipline is degrading, and that it engenders bitter resentment in the mind of the convict.

In some of the Southern States prisoners are leased out to the highest bidders for the term of their sentences; but this system,

which condemns the convicts to a slavery that is not modified even by considerations arising from personal ownership, is gradually being abandoned. The first place of detention for juvenile delinquents was opened at New York in 1825; the first reformatories on the cottage or family system were established in Ohio—for boys at Lancaster in 1858, for girls at Delaware in 1878.

Prisoners of War, those who are captured from the enemy during naval or military operations. By the laws or recognized principles of war, the entire people of a vanquished town, state, or nation become the absolute property of the victors. In ancient times the treatment of prisoners of war was very severe. In the Greek wars it was no uncommon thing to put the whole adult male population of a conquered state to the sword, while the women and children were enslaved. Though the putting to death of prisoners became less frequent, they and their families were commonly reduced to slavery to as recent a period as the 13th century. The act of Napoleon in putting to death the Turkish prisoners of war at Jaffa in 1799 was universally condemned, and is probably the last instance of such barbarity. By degrees the more humane custom of exchanging prisoners came into practice, those not exchanged being kept in confinement on very poor fare. Notwithstanding frequent exchanges, large numbers of prisoners accumulate during war. In 1811 about 47,600 French were prisoners in England, while 10,300 English languished in the prisons of France. By the end of the Franco-German War of 1870–1871 about 300,000 French troops had been sent to Germany as prisoners of war, many of the officers being released on parole. In the American-Spanish War of 1898, the United States government sent the surrendered Spanish army of Santiago to Spain at its own expense.

Privat Docent, a graduate of a German university who is admitted of his own application to the governing body, and after giving evidence of adequate qualifications, is recognized as a member of its staff of teachers. His lectures are announced on the official notice board, side by side with those of the ordinary professors, and his certificate of attendance has equal force and validity with theirs for all public purposes. He has, however, no share in the government of the university, and receives nothing but what he makes by the fees of the students who attend his lectures. Many distinguished men have held the position of privat docent, Kant among others, and it is often the stepping stone to an appointment as professor.

Privateer

Privateer, a ship owned by a private individual, which under government permission, expressed by a letter of marque, makes war on the shipping of a hostile power. To make war on an enemy without this commission, or on the shipping of a nation not specified in it, is piracy. Privateering was abolished by mutual agreement among European nations, except Spain, by the Declaration of Paris in 1856; but the United States of America refused to sign the treaty, except on condition that all private property at sea, not contraband, should be exempt from capture. This "Marcy," or "American," amendment, as it was called, was not accepted. This doctrine was again affirmed by the United States delegates to the Peace Conference at The Hague in 1898, but was again rejected by the European powers. It is doubtful, however, how far the abolition of privateering would stand in a general war, for it is the natural resource of a nation whose regular navy is too weak to make head against the maritime power of the enemy, especially when the latter offers the temptation of a wealthy commerce. It was usual for the country on whose behalf the privateers carried on war to take security for their duty respecting the rights of neutrals and allies, and their observing generally the law of nations. While not considered PIRACY (*q. v.*) by the law of nations, they were looked on as little better during the great wars at the end of the 18th and the beginning of the 19th century, and as a rule received but scant mercy at the hands of the regular services. In the wars of 1793-1814 many English privateers were afloat. But in the same period no less than 10,871 English ships, with over \$5,000,000,000, were taken by French "corsairs"; the Breton privateer "Surcouf" took, in two months of 1807, prizes worth \$1,456,250. At the American Revolution the new republic fully realized the advantage of its position in preying on the mercantile marine of Great Britain; and in the War of 1812 British commerce suffered severely at the hands of American privateers, of which it was computed that some 250 were afloat. During the American Civil War the Confederate States offered letters of marque to persons of all countries, but no admittedly foreign vessels were so commissioned. During the same period the Congress of the United States empowered the President to grant commissions to privateers, but none such were granted. The Confederate cruisers were at first regarded in the North as mere pirates; and the "Alabama Claims" originated in the charge against Great Britain of allowing the departure of privateers from British ports, where they were fitted out illegally.

Privy Council

Privet (*Ligustrum*), a genus of plants of the natural order *Oleaceæ*, containing a number of species of shrubs and small trees with opposite leaves, which are simple and entire at the margin; the flowers small, white, and in terminal panicles; the calyx slightly four-toothed; the corolla funnel-shaped and four-cleft; the stamens two, projecting beyond the tube of the corolla; the berries two-celled. Common privet (*L. vulgare*) is a shrub growing in bushy places and about the borders of woods in the middle and S. of Europe, and in some parts of Great Britain, now also naturalized in some parts of North America. It has half-evergreen, smooth, lanceolate leaves; and berries about the size of peas, black, rarely white, yellow, or green. The flowers have a strong and sweetish smell; the leaves are mildly astringent, and were formerly used in medicine. The berries, which hang on the shrub during winter, have a disagreeable taste, but serve as food for many kinds of birds; they are used for dyeing red, and, with various additions, green, blue, and black. A rose-colored pigment obtained from them is used for coloring maps. The wood is hard, and is used by turners, and by shoemakers for making wooden pegs. Privet, though not spiny, is much used for hedges, often mixed with some spiny shrub, or with beech. It bears clipping well, and grows well in the smoke of towns, also under the shade of trees. A number of species of privet are natives of different parts of the East, and some of them are now to be seen in shrubberies in Great Britain. Most kinds of privet grow readily from cuttings, but some of the more ornamental kinds are increased by grafting them upon the common or other more vigorous species. It has now been proved that the shrub the white wax insect of China deposits the wax on is *L. lucidum*.

Privileged Witnesses, witnesses who are not obliged to testify as to certain things, as lawyers in relation to their dealings with their clients, and officers of State as to State secrets; also, by statute, in some instances, clergymen and physicians are placed in the same category, so far as concerns information received by them professionally.

Privy Council, in English law, the principal council of the sovereign, consisting of members chosen at his or her pleasure. Its dissolution depends on the royal pleasure; by common law it was dissolved *ipso facto* by the demise of the sovereign, but to prevent the inconvenience of having no council in being at the accession of a new prince, the privy council is enabled by statute to continue for six months after the demise of the crown, unless sooner dissolved by the successor. It is presided over by the Lord

President of the Council, who has precedence next after the Lord Chancellor. Members of the privy council are addressed as Right Honorable. The duty of a privy councilor appears from the oath, which consists of seven articles:

1. To advise the king according to the best of his cunning and discretion; 2. To advise for the king's honor and good of the public, without partiality through affection, love, meed, doubt, or dread; 3. To keep the king's council secret; 4. To avoid corruption; 5. To help and strengthen the execution of what shall be there resolved; 6. To withstand all persons who would attempt the contrary; and lastly, in general, 7. To observe, keep, and do all that a good and true councilor ought to do to his sovereign lord.

The office of a privy councilor is now confined to advising the sovereign in the discharge of executive, legislative, and judicial duties. The former have, since the accession of Queen Anne, been intrusted to responsible ministers; and it has consequently become the settled practice to summon to the meetings of the council those members of it only who are the ministers of the crown. The power of the privy council is to inquire into all offenses against the government, and to commit the offenders for trial; but their jurisdiction is only to inquire and not to punish, except in the case of the judicial committee, which has full power to punish for contempt and to award costs. The duties of the privy council are, to a great extent, performed by committees, as the judicial committee, who hear allegations and proofs, and report to the sovereign, by whom judgment is finally given, and the committee of council on education, presided over by the vice-president of the council, who is a member of the government.

Privy Seal, the seal used in England to be appended to grants which are afterward to pass the great seal, and to documents of minor importance, which do not require to pass the great seal. In Scotland there is a privy seal used to authenticate royal grants of personal or assignable rights.

Prize, that which is taken from an enemy in war; that which is seized by fighting, especially a ship, with the goods contained in her; any description of goods or property seized by force as spoil or plunder. The law as to prizes taken at sea is regulated by international law. In order to vest the title of the prize in the captors it must be brought with due care into some convenient port for adjudication by a competent court.

Prize Court, a court established to adjudicate on prizes captured at sea. In the United States, the United States District Courts have jurisdiction both as instance and prize courts, there being no distinction in this respect as in England, where the prize court is a separate branch of the court of admiralty, the other branch being called the instance court.

Prize Money, money paid to the captors of a ship or place where booty has been obtained, in certain proportions according to rank, the money being realized by the sale of the booty.

Prize Ring, a ring or inclosed space in which prize-fights are fought. Originally such contests, no doubt, took place within a ring formed by the spectators, but now the "ring" is a square space of eight yards.

Proa, or Prah, a narrow canoe, 30 feet long and 3 feet wide, used by the natives of the Ladrone Islands. The stem and stern are similar, the boat sailing either way. The lee side is flat, so that the canoe resembles half of a vessel divided vertically in the line of the keel. Extending to leeward is an outrigger, consisting of a frame at the end of which is a floating canoe-shaped timber, which prevents the crank and narrow canoe from upsetting. Also, a Malayan boat propelled by sails and oars.

Probabilism, in Roman theology, the doctrine, first propounded by Medina, a Spanish Dominican (1528-1581) and professor at Salamanca, and thus formulated by Gury, that, in matters of conscience, "of two opinions it is lawful to follow the less probable, provided that opinion rests on solid grounds." From Medina's death till about 1650 Probabilism flourished, and then a reaction set in in favor of Probabiliorism. St. Alphonsus Liguori (1732-1787) in his "Homo Apostolicus" and "Theologia Moralis" revived Probabilism, which is now the ordinary rule of confessors in the Roman Church.

Probabilist, supporter of the casuist doctrine of Probabilism. They are usually divided into (1) Probabilists pure and simple, who hold that a man may use his liberty if he has really probable grounds for thinking the law does not bind him, though the argument on the other side is the more probable. (2) *Æquiprobabilists*, who hold that a man does wrong to use his liberty unless the probabilities are at least evenly balanced.

Probability, that which is or appears probable; anything which has the appearance of probability or truth. (In this sense the word admits of a plural number.) In mathematics, likelihood of the occurrence of an event; the quotient obtained by dividing the number of favorable chances by the whole number of chances, both favorable and unfavorable. The word chance is here used to signify the occurrence of any event in a particular way, when there are two or more ways in which it may occur, and when there is no reason why it should happen in one way rather than in another. One of the most common and useful applications of the methods of probabilities is in computing the elements employed in the subject of an-

Probang

nuities, reversions, assurances, and other interests, depending on the probable duration of human life.

Probang, a slender whalebone rod with a piece of sponge on one end, for pushing down into the stomach bodies which may have lodged in the œsophagus. Larger and stronger forms are used in veterinary surgery.

Probate, in law, the official proof of a will. This is done either in common form, which is upon the oath of the executor before the judge of the probate court; or *per testes* (by witnesses), in some solemn form of law, in case the validity of the will is disputed.

Probate Court, a court of record established to exercise jurisdiction and authority in relation to probate of wills and letters of administration, and to hear and determine all questions relating to matters and causes testamentary.

Probationer, one who is in a state of probation or trial, so that he may give proof of his qualifications for a certain position, place, or state. Also a student in divinity, who, producing certificates from the theological professors in a university of his good morals and qualifications, and showing also that he has gone through the prescribed course of theological studies, is admitted to several trials by a presbytery, and on acquitting himself satisfactorily, is licensed to preach.

Proboscidea, in zoölogy, an order of Mammalia, characterized by the absence of canine teeth; the molars few in number, large, and transversely ridged or tuberculate; incisors always present, growing from persistent pulps, and constituting long tusks. The nose is prolonged into a flexible, highly sensitive cylindrical trunk, at the extremity of which the nostrils are situated, and terminating into finger-like prehensile lobe. Feet with thick pad, and pentadactyle, but some of the toes are only partially indicated externally by the divisions of the hoof. Clavicles absent; testes abdominal; two mammae, pectoral; placenta zonary and deciduate. One living genus, *Elephas*.

Proboscis, in literature the elongated nose of an elephant or tapir. Loosely applied to the spiral trunk of the Lepidoptera, the suctorial organ of some Hymenoptera, as the Apiareæ, the pharynx of the errant annelids, the retractile oral organ of Gephyræa, the preoral organ of Planarida, the central polypite of Medusa, etc.

Proboscis Monkey, or **Kahau** (*Presbytes nasalis*), a native of Borneo, distinguished particularly by its elongated nose, its shortened thumbs, and its elongated tail.

Procedure

The general color is a lightish red. These monkeys are arboreal in habits, and appear to frequent the neighborhood of streams and rivers, congregating in troops.



PROBOSCIS MONKEY.

Probus, **Marcus Aurelius**, a Roman emperor; born in Sirmium, Pannonia; early entered the army, and had the good fortune to attract the favorable notice of the Emperor Valerian. His subsequent conduct justified his rapid promotion, for he greatly distinguished himself on the Danube, and in Africa, Egypt, Asia, Germany, and Gaul. By the Emperor Tacitus he was appointed governor of the Asiatic possessions of Rome; and such was the zealous attachment evinced for him by his soldiers that on the death of Tacitus they forced him to assume the purple; and, his rival Florianus having been removed, Probus was enthusiastically hailed emperor by all classes (A. D. 276). His brief reign was signalized by brilliant and important successes; the Germans were driven out of Gaul, and the barbarians from the Rhætian, Pannonian, and Thracian frontiers; and Persia was forced to agree to a humiliating peace. The external security of the empire being established, Probus devoted himself to the development of its internal resources. But fearing that the discipline of the army would be deteriorated by inactivity, he employed the soldiers as laborers in executing various extensive and important works or public utility. Such occupations, considered as degrading by the soldiers, excited among them the utmost irritation and discontent; and a large body of troops engaged in draining the swamps about Sirmium murdered their excellent emperor in 282.

Procedure, Civil, the method of proceeding in a civil suit throughout its various stages. In the United States, when redress is sought for a civil injury, the injured party brings an "action" against the party whom he alleges has done the injury. The

Process

person who raises an action is termed the "plaintiff," and he against whom the action is brought the "defendant"; in Scotland the terms are "pursuer" and "defender." It is usual before the suit is commenced for the plaintiff's attorney to acquaint the defendant with the demand of his client, and state that unless complied with legal proceedings will be instituted. Should this not have the desired effect, the action is begun as a rule by issuing against the defendant a "writ of summons," commanding him to enter "an appearance" in court, failing which an appearance will be entered for him by the plaintiff. When an appearance has been entered both parties to the suit are now said to be "in court," and judgment may be proceeded with. The next stage is the "pleadings" or the statements in legal form of the cause of action or ground of defense brought forward by the respective sides. The next stage of procedure after the pleadings is the "issue," which may be either on matter of law, when it is called a "demurrer," or on matter of fact, where the fact only is disputed. A demurrer is determined by the judges after hearing argument on both sides, but an issue of fact has to be investigated before a jury, and this is denominated "trial by jury." After the judge has summed up to the jury the "verdict" follows and then the "judgment" of the court; where there is no jury, of course, judgment is pronounced by the judge after hearing counsel.

Process, in anatomy, an enlargement, such as the cygomatic process of the temporal bone, the vermiform process of the cerebellum, etc. In botany, any extension of the surface; a protrusion whether natural or monstrous. In law, a term applied to the whole course of proceedings in a cause, real or personal, civil or criminal, from the original writ to the end of the suit; properly, the summons citing the party affected to appear in court at the return of the original writ. This was sometimes called original process, being founded on the original writ; and also to distinguish it from mesne or intermediate process, which issues, pending the suit, upon some collateral interlocutory matter; as to summon witnesses, and the like.

Procession, the act or state of proceeding or issuing forth or from. Also a train or persons marching on foot, or riding on horseback or in vehicles with ceremonious solemnity.

Procession of the Holy Ghost, in theology, the noun procession is not found in Scripture, it was, however, legitimately framed by theologians from the verb occurring in John xv: 26, "The Spirit of truth, which proceedeth from the Father." There is no similar passage categorically stating pro-

Proclamation

cession from the Son, and the question arises, can equivalent language be found? If the words in John xiv: 26, "The Comforter, which is the Holy Ghost, whom the Father will send in my name," imply the procession of the Holy Ghost, so do these in xv: 26, "But when the Comforter is come, whom I will send unto you from the Father," and there is a Procession of the Holy Ghost from the Son as well as from the Father, if they are not equivalent there is no procession from the Son (Gal. iv: 6). In Church history, the clause "filioque" implying procession from the Father and the Son, being accepted in the West while rejected in the East, was one potent cause of the ultimate separation between the Greek and Latin Churches. The clause was accepted by the Reformed Churches and by Nonconformists generally, and appears in the Presbyterian Confession of Faith.

Processional, a service book of the Roman Catholic Church, for use in religious processions. Some of the processionals of ancient date are very rare, and highly valued by book fanciers.

Procida, an islet of Italy, between the island of Ischia and the mainland (Cape Miseno), 50 miles W. by S. of Naples; area, 1½ square miles; pop. 13,131. On its shores is the city of the same name, with a harbor, a royal palace, a State prison, and a marine school. The people fish coral, tunny, and sardines, and grow fruits, wine, and oil. The island was occupied by Great Britain on two or three occasions between 1799 and 1813.

Procida, Giovanni da, the great Sicilian patriot and chief promotor of the conspiracy known as the "Sicilian Vespers"; born in Palermo, about 1225. He was educated as a physician, became the trusted friend of the great emperor, Frederick II., and of his sons, Conrad IV. and Manfred. He took part in Conradin's unsuccessful attempt to recover his dominions from Charles of Anjou, and his estates were confiscated. The court of Aragon then received him, and conferred on him wealth and honors, but he did not forget his country and its oppressions. In 1279 he visited Sicily, and began preparing the people for the insurrection he meditated; obtained the aid of the emperor, Michael Palæologus, and the sanction of the Pope, Nicholas III.; and returned to Sicily in 1281. The insurrection broke out in March, 1282, and was completely successful. Procida it is said, took no direct part in the massacre of the French. He continued to be the counsellor of the succeeding sovereigns, and died about 1303.

Proclamation, a public notice made by a ruler or chief magistrate to the people, concerning any matter which he thinks fit to give notice about. It may consist of an

authoritative announcement of some great event affecting the state, but is most commonly used in Great Britain for the summoning, prorogation, and dissolution of Parliament. A royal proclamation must be issued under the great seal. In the United States the President issues proclamations as to treaties, days of thanksgiving, admission of new States, etc.; likewise governors of States and mayors of cities for special purposes.

Proclus, a Greek philosopher of the Neo-Platonic school; born in Byzantium in 412; was educated at Alexandria and Athens and became familiar with all branches of philosophy and theology. As a teacher at Athens he was very successful. His system aimed at the widest comprehensiveness. He not only endeavored to unite all philosophical schemes, but made it a maxim that a philosopher should embrace also all religions by becoming infused with their spirit. In his writings he professes to return to Plato, and to bring down Neo-Platonism from the misty heights to which it was raised by Plotinus. M. Cousin placed him on a level with the most distinguished philosophers of Greece, but this estimate is generally considered extravagant. His extant works include a "Sketch of Astronomy, in which he gave a short view of the systems of Hipparchus, Aristarchus and Ptolemy; "The Theology of Plato," "Principles of Theology," a "Life of Homer," etc. He died in Athens in 485.

Proconsul, in Roman antiquities, an officer who, though not actually holding the office of consul, exercised in some particular locality all the powers of a consul. The office was held for a year, and appears to have been originally an extension of power during the progress of a campaign, primarily for finishing the war without a change in the command, and then for the peaceful settlement and rule of the conquered territory. Later, certain of the provinces were ruled by ex-consuls sent out from Rome on the expiration of their terms of office, with the title of proconsul, the others being under the rule of *proprætors*.

Procop, Andrew, a Hussite leader; born in 1380. Originally a monk, he served under Ziska, and on Ziska's death became commander of the Taborites. It was under his command that the fearful raids into Silesia, Saxony, and Franconia were carried out and he repeatedly defeated German armies. He and his colleague, Procop the Younger, headed the internal conflict of the Taborites with the more moderate Calixtines; and in the battle with the Bohemian nobles at Lipau, near Böhmisschbrod, on May 30, 1434, both the Taborite commanders fell.

Procopius, an eminent Greek historian of the 6th century, the leading authority

for Justinian's reign; born in Cæsarea, Palestine. He was private secretary to Belisarius, then chief of his commissariat and his navy, and prefect of Constantinople under Justinian. Of his writings we have the "Histories," or as the author styles them, "Books about the Wars" of his time — Persian, Vandal, and Gothic; a treatise "On Buildings"; "Anecdotes" (posthumous), a supplement to the "Histories," consisting of political and personal matter he dared not publish in his lifetime.

Procrustes, in mythology, a surname for the robber Polypemon, or Damastes, who placed his victims on a bed which was either too small or too large, and to the size of which he adapted their limbs by force. He was slain by Theseus.

Procter, Adelaide Anne, an English poet; daughter of Bryan W.; born in London, England, Oct. 30, 1825. She wrote "Legends and Lyrics" (1858), which went through nine editions in seven years; and a second series (1860), which had a like success. She died Feb. 3, 1864.

Procter, Bryan Waller, pseudonym BARRY CORNWALL, an English poet; born in London, England, Nov. 21, 1787. Educated at Harrow, with Byron and Peel for schoolfellows, he was articled to a solicitor at Calne, about 1807 came to London to live, and in 1815 began to contribute poetry to the "Literary Gazette." In 1816 he succeeded by his father's death to about \$2,500 a year, and in 1823 married Basil Montagu's stepdaughter, Anne Benson Skepper (1799–1888). He had meanwhile published four volumes of poems, and produced a tragedy at Covent Garden, whose success was largely due to the acting of Macready and Kemble. He was called to the bar in 1831, from 1832 to 1861 was a metropolitan commissioner of lunacy. His works, issued under the pseudonym "Barry Cornwall" (a faulty anagram of his real name), comprise "Dramatic Scenes" (1819), "A Sicilian Story" and "Marcian Colonna" (1820), "The Flood of Thessaly" (1823), and "English Songs" (1832), besides memoirs of Kean (1835) and Charles Lamb (1866). He died Oct. 5, 1874.

Proctor, in English law, a person employed to manage another's cause in a court of civil or ecclesiastical law. He answers to an attorney at common law. In an English university, two officials chosen from among the Masters of Arts to enforce the statutes, and preserve good order and discipline, by repressing and summarily punishing disorder. In an American university, an executive officer whose duty it is to preserve order and enforce the laws of the institution. Proctors of the clergy, in England, clergymen elected to represent cathedral or other

collegiate churches, and also the common clergy of every diocese in convocation.

Proctor, Edna Dean, an American poet; born in Henniker, N. H., Oct. 10, 1838. Her works are: "Poems" (1866); "A Russian Journey" (1872); "The Song of the Ancient People" (1892); "Mountain Maid and Other Poems of New Hampshire" (1900); etc.

Proctor, Richard Anthony, an English astronomer, author of a large number of popular works, principally on astronomy; born in London, England, March 23, 1837. He was a graduate of St. John's College, Cambridge, in 1860. About 1885 he settled in St. Louis, and later moved to Florida. His principal popular books are the following: "Saturn and its System," "Gnomonic Star Atlas," "Half-hours with the Telescope," "Half-hours with Stars," "Other Worlds than Ours," "Light Science for Leisure Hours," "Elementary Astronomy," "Border Land of Science," "Transits of Venus, Past, Present, and Future"; "The Expanse of Heaven, Myths and Marvels of Astronomy," "Chance and Luck," "First Steps in Geometry," "Easy Lessons in Differential Calculus," and "Old and New Astronomy," on which he was at work at the time of his death. He was at this time the editor of "Knowledge," a monthly journal of popular science. He was also a very successful, popular lecturer. He died in New York city, Sept. 12, 1888.

Procurator, one who acts or transacts business for another under his authority; one who manages another's affairs; especially one who undertakes the care of any legal proceeding for another, and stands in his place. In antiquity, the governor of a Roman province under the emperors, also the officer who had the management of the imperial revenue in a province.

Procyon, in astronomy, a star of the first magnitude in Canis Minor. It may be found by drawing a line through Orion's belt and Sirius, and another from Sirius upward, at right angles to it; the latter will cut Procyon. It has a blue color, and is a binary star. In zoölogy, the raccoon, the typical genus of the family *Procyonidæ*. Body stout; head broad behind, with pointed muzzle; limbs plantigrade, but in walking the entire sole is not applied to the ground, as it is when the animal is standing. Tail non-prehensile. There are two well-defined species: *P. lotor*, from North, and *P. cancrivorus*, from South America. The specific name of the former has reference to the animal's habit of dipping all its food, except meat, in water, before eating it. Professor Mivart adds a third species, *P. nigripes*, distinguished from *P. cancrivorus* by having darker feet.

Præneste. See PALESTRINA.

Profert, in law (properly an abbreviation of *profert in curia* = he produces it in court), an exhibition of a record or paper in open court. When either party alleges any deed, he is generally obliged, by a rule of pleading, to make profert of such deed; that is, to produce it in court simultaneously with the pleading in which it is alleged. According to present usage, this profert consists of a formal allegation that he shows the deed in court, it being in fact retained in his own custody.

Profession. (1) The act of professing; an open acknowledgment or avowal of sentiments, belief, etc. (2) That which is professed; a declaration; a representation or protestation; pretense. (3) The act of declaring one's self as belonging to some particular party, opinion, creed, etc., as, a profession of Christianity. (4) The business which one professes to understand and to practise for subsistence; a calling, occupation or vocation, superior to a handicraft or trade. (5) The collective body of persons engaged in or practising a particular calling or vocation.

Professional Schools. The following is a summary of statistics of professional and allied schools in the United States at the end of the school year 1909:

Class of schools	Schools.	Instructors.	Students	Graduating.
Theological	162	1,350	<i>a</i> 10,218	1,775
Law	109	1,313	<i>b</i> 18,553	3,731
Medical	144	7,957	22,158	4,484
Dental	55	1,699	6,178	1,778
Pharmaceutical ...	78	802	5,999	1,640
Veterinary	19	373	2,677	590
Nurse training ...	1,096	.....	29,320	7,017

a 412 women included.

b 188 women included.

The number of theological students enrolled during the year showed a decrease of 110 since the previous year. During the previous four years there was an increase of only 211 in the number of theological students, or less than 3 per cent. During the same time the increase in the number of law students was nearly 33 per cent. The number of students in law was always less than the number in theology till the year 1894-1895, but since that time the number of law students has increased rapidly.

The number of medical students enrolled showed an increase of 345 over the previous year, the students in regular schools numbering 21,401; in homœopathic schools, 1,802; in others, 575. All of the medical schools which give full courses of instruction reported that they had courses of four years except 15 schools, and some of these were preparing to enter on courses of four

Professor

years. In 43 schools the annual session continues eight months or longer, 12 of these schools having sessions of nine months. In several medical schools the time of attendance now required in one year is equal to the whole time of attendance required for a degree 20 years ago. Dental students numbered 7,354, an increase of 580, while students in pharmacy numbered 3,551. During the 10 years 1889-1899 the number of students in theology increased 18 per cent.; in pharmacy, 26 per cent.; in homœopathic medicine, 55 per cent.; in regular medicine, 75 per cent.; in law, 204 per cent.; and in dentistry, 301 per cent.

Professor. (1) One who professes or makes open and public declaration or acknowledgment of his sentiments, opinions, belief, etc. (2) One who makes a public profession of religion in those churches where such a rule prevails instead of confirmation. (3) One who professes or affects unusual sanctity; one who makes a show or pretense of religion. (4) One who teaches any art, science, or branch of learning; specifically a person appointed in a university, college, etc., to deliver lectures and instruct the students in any particular branch of learning; as, a professor of Greek, a professor of theology, etc.

In the universities and colleges of the United States, and the universities of Scotland and Germany the professors compose the governing body, and are the sole recognized instructors of the students; but in the universities of Oxford, Cambridge, and Dublin the instruction is given by the tutors of the several colleges, the lectures delivered by the professors being only auxiliary. By common use, the title professor has become greatly abused, and is assumed, not only by teachers of music, dancing, drawing, etc., but even by quacks, conjurers, and teachers of boxing.

Profit, any advantage, benefit, or accession of good resulting from labor or exertion; valuable results, useful consequence, benefit, gain; comprehending the acquisition of anything valuable or advantageous, corporeal, or intellectual, temporal or spiritual. Also the advantage or gain resulting to the owner of capital from its employment in any business or undertaking; the difference between the cost of production of anything and the price for which it is sold; pecuniary gain in any action or occupation; emolument, gain. As society advances profits tend to fall to a minimum. The field of employment for capital is twofold: The land of a country, and foreign markets for its manufactured commodities. Only a limited amount of capital can be thus employed. As the quantity of capital approaches the limit, profit falls; when the

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limit is reached, profit is annihilated. The causes which retard this fall are the waste of capital by overtrading and rash speculation, improvements in production, new power of obtaining cheap commodities from foreign countries, and the perpetual flow of capital abroad for the sake of higher profit.

Net profit, the difference in favor of the seller of any commodity between the price at which it is sold, and the original cost of production, after deduction of all charges. **Profit and loss:** (1) The gain or loss arising from the buying and selling of goods, or from other contingency. (2) A rule in arithmetic by which the gain or loss on mercantile transactions is ascertained. **Rate of profit,** the proportion which the amount of profit gained from any undertaking bears to the capital employed in it. In bookkeeping both gains and losses come under the title of "profit and loss," but a distinction is made by placing the profits on the creditor side and the losses on the debtor side.

Prognathic, or Prognathous, in ethnology, a term applied to the skull of certain races of men in whom the jaw slants forward by reason of the oblique insertion of the teeth. It is determined by the size of the facial or cranio-facial angle.

Prognosis, an opinion as to the probable result of an illness, formed from a consideration of similar cases and of the case itself.

Progression, the act of progressing, advancing, or moving forward; progress, advance. In mathematics, regular or proportional advance by increase or decrease of numbers. A series in which the terms increase or decrease according to a uniform law. There are two kinds of progressions, arithmetical and geometrical. If in a series of quantities, the following relation exists between every three consecutive terms — viz., that the first has to the third the same ratio which the difference between the first and second has to the difference between the second and third, such quantities are said to be in harmonical progression. Thus if a, b, c, d , etc., be such a series that $a:c::a-b:b-c$; $b:d::b-c:c-d$, and so on; then the series a, b, c, d , etc., forms an harmonical progression. In music, there are two kinds of progression, melodic and harmonic. The former is a succession of sounds forming a tune or melody, but the term is also applied to an imitative succession of melodic phrases, that is, to a melodic sequence. Harmonic progression is the movement of one chord to another, and is diatonic or chromatic. The term is also sometimes used as synonymous with sequence.

Prohibition Party, The. In recent years the cause of absolute prohibition has made great strides in the United States. In

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the State of Maine, the mother State of prohibitory legislation, what is known throughout the world as the "Maine law" has been in successful operation for a quarter of a century. "Local option" in various forms had obtained in different localities with more or less success for several years prior to 1880. The "Ohio Crusade" of 1874 gave a great impetus to the Prohibition movement, and in the States of Iowa, Kansas, Georgia, and Rhode Island, prohibitory laws were passed and put into execution. In various other States gubernatorial and State tickets were nominated in successive years from 1876 to 1886, but no election resulted in any case. In New Jersey and in New York in 1886 great interest centered around the efforts of the Prohibition party, owing to the closeness of the vote between the two older parties, though the vote polled by the Prohibitionists amounted to only a few thousands. Since 1872 the Prohibitionists have regularly put a presidential ticket in the field, with the following candidates and votes: 1872, Black, 5,608; 1876, Smith, 9,522; 1880, Dow, 10,305; 1884, St. John, 151,809; 1888, Fisk, 249,907; 1892, Bidwell, 264,133; 1896, Levering, 132,007; 1900, Woolley, 208,914; 1904, Swallow, 258,536; 1908, Chafin, 253,840.

History—The rise and fall of prohibitory legislation in the United States will be seen by the following summary: The so-called "Maine law" was enacted in that State, 1844, forbidding the sale of intoxicating drinks except by an agent specially licensed by local or State authority. Illinois enacted prohibition in 1855, but repudiated it at the polls the same year. New York passed a law in 1854, and gave it up in 1856. Massachusetts tried prohibition for 15 years, and repealed it. An effort to secure a prohibitory constitutional amendment in Massachusetts was defeated, April 22, 1889. Atlanta, Ga., had a prohibitory law for one year and repealed it in November, 1887. Connecticut enacted the law in 1854, continued it for 18 years, and repealed it in 1872. Ohio enacted prohibition in 1855, and after a few months repealed it. Maryland passed a prohibitory law in 1885, but after a few months it was repealed. New Hampshire has had a prohibitory law not applying to manufacture for 34 years. April 12, 1889, an effort was made to incorporate it into her constitution. This was voted down, only two counties in the State giving a majority in favor of the measure. Delaware passed a prohibitory law in 1855, and after two years it was repealed. A prohibitory law was twice passed in Wisconsin, and twice vetoed by the governor. Rhode Island enacted prohibition in 1853, and after 10 years repealed the law in 1863. She adopted constitutional prohibition in 1888, but the legislature decided to resubmit the

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matter to the people who repealed the amendment in 1890. Michigan passed the law in 1853 and abandoned it in 1875. Indiana and Nebraska in 1855 passed prohibitory measures, but neither of them kept prohibition upon its statute-books for any length of time. Indiana voted on the question again in 1882, and the proposed constitutional amendment was defeated. Texas cast 93,000 majority against the effort to place a prohibitory amendment in her constitution. An effort was made to introduce the law in Tennessee in 1887. The people, after a thorough discussion, resolved not to put it into their constitution. Oregon submitted the amendment in 1887, but it was defeated. In November, 1888, West Virginia voted on the adoption of a prohibitory constitutional amendment, defeating the measure by large adverse majorities. Kansas (1881) and Iowa (1882) both adopted prohibitory amendments in their constitutions, where they still remain. North and South Dakota have constitutional prohibition but in the former State the question is to be resubmitted (1897) to popular vote. In June, 1889, Pennsylvania voted on a prohibitory amendment to the State constitution, but the popular vote was largely adverse. In the campaign of 1896, the Prohibition party divided on the free-coinage and other issues, and the smaller wing took the name National party, still retaining prohibition in their platform. It was shown in the various amendment campaigns that, of the number of votes abstractly in favor of legal prohibition, only a small fraction is in the Prohibition party. The number of votes cast for prohibition in these campaigns, and in local-option elections, far exceeds 2,000,000, while the party vote is less than 300,000, at the largest.

Projectile, a body projected or impelled forward by force, especially through the air. Thus, a stone discharged from a sling, an arrow from a bow, and a bullet from a rifle, are all projectiles, but the term is more particularly applied to bodies discharged from firearms.

Projectiles, Theory of, that branch of mechanics which treats of the motion of bodies thrown or driven some distance by an impelling force, and affected as to their progress by gravity and the resistance of the air. The most common cases are the balls projected from cannon or other firearms. If thrown horizontally, the body will move in a curved path, because it retains unchanged (leaving out of account the resistance of the air) its horizontal velocity, while it falls faster and faster toward the ground. A body projected obliquely has initially a certain horizontal velocity and a certain vertical velocity. It retains its horizontal velocity unchanged, but its vertical velocity is altered by the force of gravity,

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and in both of these cases we find that the path of the projectile is a parabola. With a given velocity the greatest range of a projectile is obtained by projecting at an angle of 45° with the vertical. The actual path of a bullet is always within the parabola of the theoretical projectile, and hence the range of a gun is much less than what the parabola would give. The range depends also on the shape and weight of the projectile as well as on its initial velocity.

The velocity of projectiles fired from modern guns ranges from 1,500 to 3,500 feet per second. It may first be stated that one cannot time a projectile as one would a horse. Some of them can be seen as they rush through the air. It is a favorite amusement during the battery drill with the old sea-coast guns at West Point to stand behind and slightly above the gun, and watch the projectile from the moment it leaves the muzzle till it strikes the target painted on old Crow's Nest Mountain, about a mile away. Spectators with good eyesight can also see the shell fired from the large mortar rise to the highest point of its course, and then descend with a rush on the mountain top, a mile and a half away, where it bursts into many pieces. It is reported that during the bombardment of Santiago, the shells of the cruiser "New Orleans" could be followed by the eye. This was largely due to the use of smokeless powder, which permitted clear vision. In the case of smaller projectiles, with greater velocity, it is impossible to see them during flight. But whether they can be seen or not, it is quite out of the question to time them as one would a race, by simply using the eye and a stop watch. The least hesitation in pushing the spring would make a difference of hundreds of feet in the distance traveled. Errors such as these would make the results of no practical value. Our small arm shoots a bullet only one-third of an inch in diameter, which travels 2,000 feet in a second, or a mile in three seconds. It goes so fast that it becomes hot to the touch, due to the resistance of the air which it pushes aside. Strange to say, the heated bullet will cauterize the wound of its own making, and few of the wounded in the Spanish-American War of 1898 bled to death, except when struck in a vital spot.

The projectile has, besides the forward velocity, a rotational velocity, due to the rifling of the gun. Otherwise, since its length is much greater than its diameter, it would soon begin to turn end on. The rifling prevents this by causing the bullet to bore a path through the air, and the higher the forward velocity, the higher, too, must be the rotational. This turning over and over would destroy the range and the accuracy of the gun. The determination of the forward velocity is made with extreme accu-

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racy. The knowledge of it is of the utmost importance to military science.

Determining the Forward Velocity.—Various methods have been adopted for its determination within the gun, as well as at various points of the trajectory. The following method is the one adopted by all nations for finding the velocity of a projectile at any point of its path after leaving the muzzle of the gun. The chronograph most frequently used is the Le Boulengé. It is so simple that a brief explanation of it will make it intelligible. Two screens, so closely strung with copper wire that a projectile in passing through must break one or more of the strands, are placed 50 yards apart. The wire on each screen is connected with a battery which sends a current through it, and with two instruments, one called a disjuncter, the other the chronograph. Though both circuits pass through these instruments, yet they are kept distinct and separate. The chronograph answers the purpose of a stop watch of greatest accuracy. Two bars are held up by electro-magnets; the currents flowing in one magnet also flow through its respective screen, while the current of the other passes through the second screen. One of these bars carries a covering of zinc tubing, and is longer than the other. It is suspended from the electro-magnet connected with the first screen.

The disjuncter is an instrument used to break both circuits simultaneously. When this is done the bars fall, as the current ceases to flow through the respective electro-magnets. The shorter bar, suspended by the electro-magnet in the circuit of the farther screen, falls on a platform; the impact with this releases a wedge-shaped steel blade, which indents the zinc on the bar suspended by the electro-magnet in circuit with the screen nearest the gun. This is taken as a point of reference. The two circuits are then re-established, and the rods suspended on their respective electro-magnets.

The gun whose muzzle velocity is to be measured is fixed so that its projectile passes through both screens before these can be affected by the blast of firing. The disruption of the first screen by the projectile breaks the electric circuit; its electro-magnet loses its potency, and the suspended bar commences falling. The projectile then passes through the second screen—breaking some wires and destroying this electric circuit; its electro-magnet losing its potency, the suspended bar falls and strikes the platform, thus releasing the indenting wedge, which makes an indentation on the zinc casing carried by the first falling bar. The distance between the origin and the indentation being accurately measured, we have from the law of falling bodies, the *time* taken in the flight of the projectile from the

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first wire screen to the second, and from this the velocity becomes known. For example, let the measured distance of fall be one inch, giving from the law of falling bodies, a time of .075 seconds for the projectile to pass over a distance of 150 feet.

The formula for this is to be $= \frac{2d}{g}$ where d = distance of fall and g = gravity, which is 32.2. The velocity is rapidly obtained by applying a suitably prepared scale and thus measuring the distance of the origin from the indentation. The readings give the velocity directly in feet per second, as the scale is prepared for given distances between screens. Thus actual computation as to time, etc., is avoided.

Determining the Trajectory.—The trajectory of a projectile is the path it travels, and the way of discovering it is simple. Screens are put up in line at intervals of 100 yards. These are covered with target cloth and are so built that they can be raised or lowered by ropes running over pulleys, which are in the framework that supports the screens. The rifle is put in a vise, the muzzle being at the same height as the distant bull's eye. On the discharge of the gun the bullet will leave a hole in each screen, and from these its trajectory is easily deduced and transferred to paper. This work is very important, since a bullet that rises over a man's head in passing a distance of 500 yards is much less effective than one which skims along the ground for the same distance. For instance, compare the trajectories of a modern small bore and the old Springfield. In going 500 yards the latter travels up 8.16 feet, while the former rises only 3.85. Between 400 and 1,200 feet, or more than half the total distance, the bullet of the Springfield passes above all ordinary-sized men, while that of the modern rifle would hit any man standing between the muzzle and the bull's eye 500 yards away. It is partly on account of these flat trajectories that large loss of life is expected in a great war. One of these bullets will kill eight men and still have some energy to spare. Guns of all sizes shoot much more rapidly than they did a few years ago. This, combined with flat trajectories, great velocity and carrying power, will materially change many of the conditions of war.

From the tables of the resistance of the air are easily calculated others connecting times of flight and velocities. Thus, by first predicting the muzzle velocity from Noble's table of the work done by the expansion of a pound of exploded gunpowder, we can predict to a fair degree of accuracy all the external ballistics of a projectile to be fired from a proposed gun. For a further account of the general subject of ballistics see the articles GUN; GUNNERY. E. L. ZALINSKI.

Prolapsus

Projection. (1) The act of projecting, shooting, or throwing out or forward. (2) The state or condition of projecting or extending out further than something else; a jutting out. (3) A part which projects or extends out further than something else; a portion jutting out; a prominence. (4) The act of projecting, planning, devising, or contriving; contrivance. (5) A plan, a project, a scheme, a design. (6) The representation on a plane surface of the parts of an object; especially the representation of any object on a perspective plane, or such a delineation as would result were the chief points of the object thrown forward on the plane, each in the direction of a line drawn through it from a given point of sight or central point. There are several kinds of projection of the sphere, according to the situations in which the eye is supposed to be placed in respect to the sphere and the plane on which it is to be projected; such are the conical, globular, gnomonic, isometric, orthographic, spherical, and stereographic projections. (See under these words). (7) In alchemy, the casting of a certain portion, called powder of projection, into a crucible or other vessel full of prepared metal or other matter to be transmuted into gold.

Cylindrical projection: When the eye is taken at the center of the sphere, and the surface of an equatorial zone is projected on a cylindrical surface tangent to the surface of the sphere, along the equator, which cylinder, with the projection, is developed upon the surface of a plane tangent to the surface of the cylinder along one of its elements. **Plane of projection:** One of the planes, to which points are referred in descriptive geometry for the purpose of determining their relative position in space. **Polar projection:** When the eye is taken at the center of the sphere, and the principal plane passes through one of the polar circles. **Projection of a curved line:** The projection of a curved line upon a plane is the intersection of the plane with a cylinder passed through the curve, and perpendicular to the given plane. **Projection of a point upon a plane:** In descriptive geometry, the foot of a perpendicular to the plane, drawn through the point. **Projection of a straight line:** The projection of a straight line on a plane is the trace of a plane passed through the line and perpendicular to the given plane.

Prolapsus, in pathology, a protrusion, as well as a falling down, of a part of some entrail, so as to be partly external, or uncovered, thus differing from procidence. Chiefly used in the expressions *prolapsus ani* (a falling down and protrusion of the extremity of the rectum); *prolapsus uteri* (the protrusion of the womb beyond or at the vulva).

Proletariate

Proletariate, a term used to denote the lowest and poorest classes of the community. It is derived, through the French, from the Latin *proletarii*, the name given in the census of Servius Tullius to the lowest of the centuries, who were so called to indicate that they were valuable to the state only as rearers of offspring (*proles*). The word has come much into use in the literature of Socialism.

Prolocutor, the chairman or speaker of one of the houses of Convocation. The prolocutor of the lower house is a member chosen by the House, and presented to the bishops of the higher house as the person through whom all resolutions passed by the



PROMETHEUS AND THE OCEANIDES.

lower house will be communicated to the upper house, and who is to act as chairman and moderator of their proceedings.

Prologue, a preface or introduction to a discourse or performance; especially an introductory discourse or verses spoken before a dramatic performance or play begins.

Promerops, in ornithology, the sole genus of the *Promeropinæ*. Bill long, sub-

Promise

curved; nostrils linear, in a fossa; tongue feathery; wings with 10 primaries; tail long, cuneate. Two species, *P. (Merops)*, Linn.) *caffer* and *P. gurneyi*, from South Africa.

Prometheus, in mythology, the son of the Titan Japetus, was brother to Atlas and Epimetheus, and surpassed all mankind in cunning. He ridiculed the gods, and deceived Jupiter himself. To punish Prometheus and the rest of mankind, Jupiter took fire away from the earth; but Prometheus climbed to the heavens, by the assistance of Minerva, and stole fire from the chariot of the sun. This provoked Jupiter, who ordered Vulcan to make a woman of clay, and, after he had given her life, he sent her to Prometheus, with a box of the most valuable presents (see PANDORA). Prometheus suspecting the snare, took no notice of Pandora, but induced his brother to marry her, when the god, still more irritated, caused this wily mortal to be tied to a rock on Mount Caucasus, where, for 30,000 years, a vulture was to feed on his liver, which was never to be diminished. He was delivered from this punishment 30 years afterward, by Hercules.

Promise. (1) A declaration, verbal or written, made by one person to another, by which the person giving the promise binds himself to do, or forbear from doing, some specific act, and which gives the person to whom the promise is made a right to expect and to claim the performance or forbearance of the specified act. (2) A ground or basis for expectation; earnest, pledge. (3) A ground or basis for expectation or hope of future distinction or excellence. (4) That which is promised; performance or grant of the thing promised.

In law, a declaration made by one person to another for a good or valuable consideration, whereby the person promising binds himself to do or forbear some act, and gives to the promisee a legal right to demand and enforce a fulfillment.

"A promise is in the nature of a verbal covenant, and wants nothing but the solemnity of writing and sealing to make it absolutely the same. If, therefore, it be to do any explicit act, it is an express contract, as much as any covenant; and the breach of it is an equal injury. The remedy is by an action on what is called the *assumpsit* or undertaking of the defendant; the failure of performing which is the wrong or injury done to the plaintiff, the damages whereof a jury are to estimate and settle."—Blackstone.

Promise and offer in Scotch law, an offer is a proposal made by the offerer to the person to whom the offer is addressed, to give or to do something either gratuitously or on an onerous consideration. A promise is an offer with this addition, that the promiser, from the nature of his proposal, thinks it unnecessary to wait for the other party's assent, which he takes for granted. An offerer is not bound till his offer is ac-

cepted. A promiser is bound as soon as the promise reaches the party to whom it is made. A promise may be absolute or conditional, lawful or unlawful, express or implied. An absolute promise must be fulfilled in all events. The obligation to fulfill a conditional promise depends on the performance of the condition. An unlawful promise is not binding, being void by the nature of it, as being incompatible with a prior paramount obligation of obedience to the laws. An express promise is one expressed in words or writing. An implied promise is one which reason and justice dictate. A promise without deed is said to be parol, and the term is usually applied to engagement by parol only, a promise by deed being technically called a covenant.

Promise, Breach of. See BREACH.

Promised Land, Canaan; that portion of Syria lying between the Jordan and the Mediterranean. It was frequently promised by Jehovah to the patriarchs (Gen. xii: 7; xiii: 15; xxviii: 13; xxxv: 12), and finally bestowed on their descendants, the Israelites.

Promissory Note, a written promise to pay a given sum of money to a certain person, at a specified date. The phrase "for value received" is usually inserted.

Prompter, one who or that which prompts, urges, or incites to action or exertion. Also, one who assists a speaker,



PRONG-HORN ANTELOPE.

when at a loss, by suggesting or repeating words. Specifically, a person placed behind the scenes in a theater, whose duty is to prompt or assist the actors when at a loss, by uttering the first words of a sentence, or words forgotten.

Prong-horn Antelope, the *Antilocapra americana*, inhabiting the W. parts of North America, from 53° N. to the plains of Mexico and California. It is rather more than four feet in length, and stands three feet at the shoulder. Pale fawn above and on the limbs; breast, abdomen, and rump white. The horns are branched, and are shed annually.

Pronoun, a word used in place of a noun or name in order to avoid the too frequent repetition of such noun or name, but differing from a noun in not being permanently attached to any certain object or class of objects, and in not being limited in its application. Pronouns in English are divided into: (1) Personal, (2) Demonstrative, (3) Interrogative, (4) Relative, and (5) Indefinite. Interrogative pronouns are those which serve to ask a question, as who? which? what? Indefinite pronouns, or such as do not specify any particular object, are used, some as substantives, some as adjectives; as, any, aught, each, every, other, etc. In Middle English man, men, or me was used as an indefinite pronoun, its place being now taken by one, as in "One says."

Proofs, Correction of. The corrections to be made on a "proof" of printed matter are marked on the margin; and for this purpose an established set of signs is used. The following specimens of a proof exhibits the application of most of these signs:

'To rule the nations with imperial
 swφy, to impose terms of peace, to
 spare the humbled, and to rcush the
 proud, resigning itto' others to de-
 scribe the courses of the heavens, and
 explain the rising stars; this, to use
 the words of the poet of the Æneid
 in the 'apostrophe of Anchises to
 Fabius in the Shades, was regarded
 as the proper province of a Roman.
 The genius of the people was even
 more adverse to the cultivtion of the
 physical sciences than that the Euro-
 pean Greeks, and [seen] we have| that
 the latter left experimental philosophy
 chiefly in the hands of the Asian and
 African colonists, The elegant litera-
 ture and metaphysical specu³lations
 of Athens, her histories, dramas, epics,
 and orations, had a numerous host of
 admirers in Italy, but a feeling of
 indifference was displayed to the
 practical science of Alexandria. [' This

¹ a
² tr.
³ #
⁴ |
⁵ *Italic.*
⁶ ,/
⁵ *S. caps.*
⁷ *stet.*
⁸ 9
⁹ of
⁶ ;/ ² tr.
¹⁰ wf.
⁸ ⊙
¹¹ δ
² tr.
¹² *Roman.*
¹³ *New line*

repugnance of the Roman mind at home to mathematics and physics, extending from the Atlantic to the Indian Ocean, from Northern Britain to the cataracts of the Nile, annihilated in a measure all pure sciences in the conquered districts where they had ~~had~~ been pursued, and prohibited attention to them in the mother country.

Long, indeed, after the age of Ptolemy, the school in connection with which he flourished, remained in existence; &c.

14 *and its
despotism
abroad,*

3 # 15 C

16 *the*

17

11 δ

18 -/

19 *Run on.*

5 *Caps.*

20 \checkmark

(1) A wrong letter. After every mark of correction a line | should be drawn, to prevent its being confounded with any other in the same line. (2) A word or letter to be transposed. Where letters only are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. (3) A space wanted. This mark is also used when the spacing is insufficient. (4) A space or quadrant sticking up. (5) Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. (6) Correction or insertion of stops. (7) A word struck out, and afterward approved of (Latin *stet*, "let it stand"). (8) A turned letter. (9) An omission. (10) A letter of a wrong font. (11) A word or letter to be deleted. (12) Alteration of type. (13) A new paragraph. (14) Insertion of a clause. (15) A space to be removed or diminished. (16) A wrong word. (17) When letters or lines do not stand even. (18) Mark for a hyphen. (19) No new paragraph. (20) The manner in which the apostrophe, inverted commas, the star and other references, and superior or "cock-up" letters and figures are marked.

The immediate object of a proof-reader or corrector is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation, abbreviations, etc., and in many cases to the verification of quotations, dates, and proper names. Where extensive alterations, omissions, or additions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs, or the suppression of those in type, should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are employed, such as newspapers and cyclopædias. The corrector has also to direct his attention to the numbering of the pages: to the arrangement of chapters,

paragraphs, and notes; to running titles, etc. It is part of his business to observe the mechanical defects of the work — defective types, turned letters, inequalities of spacing between words, sentences, and lines, crooked lines, and to secure symmetry in verses, tables, mathematical operations, and such like. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, etc., even more. Lastly follows the revision, in which little more is done than seeing that the compositor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second proof for himself.

The thankless and monotonous business of a proof-reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and, above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter. See PRINTING.

Propaganda Fide, Congregation de, a commission of cardinals charged with the direction of all matters connected with foreign missions in the Roman Church. The Congregation was established by Gregory XV. by the bull "Inscrutabile" (July 22, 1622), and now has its seat in the Palazzo Ferrattini, in the Piazza di Spagna, Rome. Pope Urban VIII. (1623-1644) founded the Propaganda College in furtherance of the design of his predecessor; and here young men of all nations are trained for the priesthood, and take an oath to devote themselves for life to the foreign missions in whatever province or vicariate they may be appointed to by the congregation.

Propagation, the act of propagating; continuance or multiplication of the kind or species by generation or reproduction. Also, the spreading or dissemination of anything, as of doctrines, learning, etc.; diffusion.

Propeller, one who or that which propels; specifically, the screw by which a steamship is driven through the water; a vessel thus propelled.

Propertius, Sextus Aurelius, a Roman poet; born in Melvina, about 52 B. C. Nothing more of his life is known than that, after the end of the civil war, he found a patron at Rome, in Mæcenæ, through whom he obtained the favor of the emperor. He appears to have been the bosom friend of Ovid, and was also on terms of intimacy with other eminent contemporaries. His life appears to have been a series of amours, and his "elegies" are, for the most part, expressions of his passion.

Property Tax, a rate or duty levied by the State, county, or municipality on the property of individuals, the value of the property being fixed by assessment.

Prophet

Prophet, one who prophesies; one who foretells future events; a foreteller, a predictor: specifically, one who, under divine inspiration and instruction, announced future events, as Moses, David, Isaiah, etc.

Prophets, School of the, an association of the prophets in which the elder lovingly trained the younger, who were called their sons (I Kings xx: 35). First Elijah, and then Elisha, presided over such a society.

Prophets, The, men divinely inspired, and who often uttered predictions of future events. Three Hebraic words are applied to the Old Testament prophets; the most common is *nabhi*, from the verb *nabha* = primarily, to bubble forth, to send forth copious floods of speech, hence in Niphal = to speak under a divine impulse, to prophesy (I Sam. ix: 9; I Kings xx: 13); the second *roeh* = a seer, from *raah* = to see (I Sam. ix: 9), and the third *chhozeh* = a seer, from *chhazah* = to see, to look (I Chron. xxi: 9; xxv: 5, etc.). It is connected with *chhazon* = a vision. The second term was the oldest (I Sam. ix: 9). Both it and *chhozeh* suggest that the subjects of the prophecies passed before the eyes of the seer in panoramic vision (Isaiah i: 1; Ezek. i: 4; Rev. i: 12), he simply recording what he saw. In many cases, however, words were communicated (Jer. i: 4, 9, 11, 12). The first word, *nabhi*, suggested that when inspired communications had to be made, the prophet, like a frenzied person raving, uttered words in a copious flood, flowing forth with some considerable impulse. Abraham is called a prophet (Gen. xx: 7); it is implied that Moses was one (Deut. xviii: 15; Acts vii: 37), but the more typical prophets began with Samuel (Acts xiii: 20), who was a civil ruler as well. Yet the full development of the prophetic order was not till the separation between the two kingdoms. In Judah the general faithfulness to Jehovah left them less scope. In the kingdom of Israel, on the other hand, where the worship, even when nominally that of Jehovah, was idolatrous, and where that of Baal often prevailed, the prophets were very prominent and influential, denouncing apostasy and moral depravity. The first, like Elijah, Elisha, etc., have left no writings; the later prophets have. The last of the Old Testament prophets passed away with Malachi, and scribes took their place. In the early Church there were prophets (Rom. xii: 6; I Cor. xii: 28; Ephes. iv: 11, etc.). Their chief function seems to have been preaching in the church (I Cor. xiv: 2-5).

Prophet's City, a name by which Medina, in Arabia, is often referred to. To this place Mohamed fled for refuge during the Hegira, July 16, 622, and here is his tomb.

Proportion, a word with several applications. (1) The comparative relation of

Proposition

one thing to another as regards size, quantity, extent, degree, etc. (2) Settled relation of comparative quantity; equal or corresponding degree. (3) The relation of one part to another, or to the whole with respect to magnitude; the relative size and arrangement of parts. (4) Symmetrical arrangement; symmetry; the symmetrical adaptation or adjustment of parts in a whole. (5) That which falls to one's lot when a whole is divided according to a rule or principle; just share, lot, or portion.

In archæology, art, etc., that due observance of the balance of parts, in a statue or picture, which constitutes excellence. In arithmetic, a rule by which from three given quantities a fourth may be found bearing the same ratio to the third as the second bears to the first. Also called the Rule of Three. In mathematics, the relation which one quantity bears to another of the same kind, with respect to magnitude or numerical value. This relation may be expressed in two ways: (1) By the difference of the quantities, and (2) by their quotient. When the relation is expressed by their difference, it is called an arithmetical proportion; when by their quotient, geometrical proportion, or simply proportion. Four quantities are in proportion when the ratio of the first to the second is equal to the ratio of the third to the fourth; this relation is expressed algebraically thus: $a:b::c:d$. This expression is called a proportion; it is read, a is to b as c is to d , and is equivalent to the expression $b \div a = d \div c$. Hence a proportion may be defined to be the algebraic expression of equality of ratios.

Compound proportion, the equality of the ratio of two quantities to another ratio, the antecedent and consequent of which are respectively the products of the antecedents and consequents of two or more ratios. Reciprocal proportion: a proportion in which the first term is to the second as the fourth to the third, $4:2::3:6$. Rhythmical proportion in music. The proportion in relation to time or measure between different notes representing durations; thus, the semibreve is to the minim as 2:1, the semibreve to the crotchet as 4:1. Simple proportion: The relation of equality subsisting between two ratios.

Proportional Representation, an idea of representation a realization of which would insure the presence in a representative assembly of members divided in opinions in the same proportion in respect of numbers as the community represented. Example: If an assembly of 100 members had a constituency of 100,000 persons, and the constituency was divided into 60,000 of party A and 40,000 of party B the assembly should consist of 60 members of party A and 40 of party B.

Proposition, in geometry and mathematics, a statement in terms of something

proposed to be proved or done. In grammar, a sentence, or part of one, consisting of a subject, a predicate, and copula. In logic, a sentence, or part of a sentence, affirming or denying a connection between the terms; limited to express assertions rather than extended to questions and commands. Logical propositions are divided: First, as to substance, into categorical and hypothetical; secondly, according to quality, into affirmative and negative; and thirdly, according to quantity, into universal and particular. In poetry, the first part of a poem, in which the author states the subject or matter of it. In rhetoric, that which is proposed, offered, or affirmed, as the subject of a discourse or discussion.

Proprætor, in Roman antiquities, a magistrate, who, after the expiration of his term of office as prætor, was sent out as governor of a province, with the same authority as a prætor. Generally speaking, proprætors were sent to govern provinces in which tranquillity prevailed, and which were not likely to be disturbed, proconsuls being appointed to the more important or doubtful provinces. The proprætor had supreme jurisdiction in all cases, criminal or civil, and could imprison, scourge, or even put to death, provincials; but Roman citizens, though resident abroad, had, in all criminal cases, right of appeal to Rome.

Propylæum, in Greek architecture, a portico in front of a gate or temple doorway; the entrance to a Greek temple, a sacred inclosure, consisting of a gateway flanked by buildings; specifically, the entrance to the Acropolis of Athens, an architectural work executed under the administration of Pericles.

Prorogation, the act of continuing, proroguing, or protracting; continuance in time or duration; a lengthening out in time; prolongation. In English law, the act of proroguing; the interruption of a session, as distinguished from an adjournment, which is from day to day, and may be of either or both houses, while a prorogation is of Parliament. In English law, the time during which Parliament is prorogued.

Proscenium, the stage of a theater, or the space included in the front of the scene; in contradistinction to the postscenium, or space behind the scene. In the modern theater it is improperly used to designate the ornamental framework from which the curtain hangs when performances are not going on, dividing the spectator from all engaged on the stage.

Proscription, in Roman history, a mode of getting rid of enemies, first resorted to by Sulla in 82 B. C., and imitated more than once afterward in the stormy years that closed the republic. Under Sulla, lists of names were drawn out and posted up in

public places, with the promise of a reward to any person who should kill any of those named in the lists, and the threat of death to those who should aid or shelter any of them. Their property also was confiscated, and their children were declared incapable of honors.

Prosecution, in law, (1) the instituting and carrying on of a suit in court of law or equity to obtain some right, or to redress and punish an injury or wrong. (2) The act or process of exhibiting formal charges against an offender before a legal tribunal, and pursuing them to final judgment; the instituting and continuing of a criminal suit against any person or persons. (3) The party by whom criminal proceedings are instituted; the prosecutor or prosecutors collectively.

Proselyte, a new convert to some religion, sect, opinion, party, or system. In Judaism, a gentile convert. Two kinds were discriminated: (1) Proselytes of the gate, who followed a few Old Testament rules, and (2) proselytes of righteousness, who accepted the whole Mosaic ritual.

Proserpine, in mythology, a daughter of Ceres and Jupiter, of extreme innocence and beauty, and who, while gathering flowers in the lovely vale of Tempe, or the Mysian Plain, was seen and carried off by the god of the infernal regions, Pluto. The prayers and intercessions of her mother ultimately prevailed on Pluto to permit her to spend half of each year on earth, to gratify and gladden the heart and eyes of her devoted parents, the other half being passed with her infernal lord in the realms below.

Prosody, that part of grammar which treats of the quantities of syllables, of accent, and of the laws of versification. In Greek and Latin every syllable had its determinate value or quantity, and verse was constructed by a system of recurring feet, each consisting of a certain number of syllables, possessing a certain quantity and arrangement. In English, verse is constructed simply by accent and number of syllables.

Prosopis, in botany, a genus of *Eumimoseæ*. Trees, prickly, thorny, or both; from the warmer parts of both hemispheres. The legume, in some species twisted, is generally filled with a sweetish substance, which may be eaten by men or cattle. *P. dulcis* is the algaroba of Paray, *P. glandulosa* that of Texas. The latter has a hard, durable, and beautifully grained wood; it yields a gum like gum arabic, as does *P. spicigera*. *P. pubescens* is the screw bean. *P. spicigera*, a native of arid places in India, is planted in Punjab, its wood furnishing excellent fuel. It is not good for

carpentry, being easily destroyed by insects. Its legume is astringent. Its bark is good for tanning, as are those of the American *P. pallida* and *P. pubescens*. The leaves and branches of *P. iuliflora* are poisonous to cattle.

Prosopopeia, or **Prosopopœia**, in rhetoric, a figure by which things are represented as persons, or inanimate object as animate beings, or by which an absent person is represented as speaking, or a deceased person as alive and present. It is more extensive than personification.

Prosper of Aquitaine, a Gallic poet of the first half of the 5th century. He wrote a hexameter poem of about 1,000 lines against the Pelagian heresy, "Against the Ungrateful." He was correspondent of St. Augustine, and after that Father's death wrote "Responsions for Augustine."

Prostate Gland, the largest of all the organs connected with the male generative system. It is an aggregation of glands of the racemose type, resembling a chestnut in size and shape, situated before the neck of the bladder, behind the *symphysis pubis*, and surrounding the first portion of the urethra. Its secretion (a white viscid humor, discharged into the urethra by 10 or 12 excretory outlets) is probably allied to that of the *vesiculæ seminales*, for which it serves as a vehicle.

Prostitution, the act or practice of offering the female body to an indiscriminate intercourse with men; common lewdness of a female. Act of setting one's self to sale, or of devoting to infamous purposes what is in one's power; as, the prostitution of the law, the prostitution of justice by a corrupt judge. In law, the common lewdness of a woman for gain. The act of permitting a common and indiscriminate sexual intercourse for hire. In all well-regulated communities this has been considered a heinous offense, for which the woman may be punished; and the keeper of a house of prostitution may be indicted for keeping a common nuisance. So much does the law abhor this offense, that a landlord cannot recover for the use and occupation of a house let for the purpose of prostitution.

Prostyle, in architecture, a temple which has a portico in one front, consisting of insulated columns with their entablatures and fastigium. Also a portico in which the columns stand out quite free from the walls of the building to which it is attached.

Protagoras, a Greek sophist; born in Abdera, 480 B. C. He was taught by Democritus, and became a teacher at Athens; traveled through the chief cities of Greece, teaching for pay, and again went to Athens, from which city he was banished on the charge of atheism. He then went to Epirus,

where he resided several years. Plato has illustrated the doctrines and the fame of this sophist in the dialogue named after him. None of the writings of Protagoras are extant. He died probably about 411.

Proteaceæ, proteads; an order of perigynous exogens, alliance Daphnales. Shrubs or small trees, with hard dry leaves, calyx in four divisions, corolla none, stamens four, some of them sterile; ovary superior, with one ascending ovule, or two, or two rows. From the Cape of Good Hope and Australia. Sub-orders *Nucamentaceæ* and *Folliculares*. Known genera 44, species 650. Various proteads, some apparently of the existing genera, *Dryandra*, *Bankisia*, *Grevillea*, etc., exist in the Cretaceous rocks of Aix-la-Chapelle, others in the Upper Molasse of Switzerland.

Protection, one of the theories concerning the best development of a country's industries by means of taxes levied for other than fiscal purposes. Incidental protectionists claim that men should labor according to the indications of nature, and that the attempt on the part of government to divert the industries of the people from one channel to another is contrary to right, reason, and sound policy; also, that since a tariff is the common means adopted by most of the civilized states of the world to produce the revenue whereby the expenses of the state are met and sustained, the same should be so levied as to be incidentally favorable to those industries of the people which are placed at a natural disadvantage. Incidental protection does not hold that any tariff should be levied with the intention of protecting and fostering a given industry, but that in every case the tax should be laid for public purposes only—*i. e.*, with the intention of sustaining the state, and be only incidentally directed to the protection of the weaker industry. These last assumptions furnish the ground of political divergence between free-traders proper and incidental protectionists. The protectionists take into consideration both the fundamental conditions of the argument and the peculiar character of the industries of a people. They claim that given pursuits may thus be strengthened and encouraged by legislative provisions, and that natural and political laws may be made to coöperate in varying and increasing the productive resources of the state.

Incidental protectionists deny and limited protectionists affirm the wisdom of levying tariff duties with the intention and purpose of protecting home industries. The limited protectionists would have the legislation of the State take particular cognizance of the character of the industries of the people, and would have the laws enacted with constant reference to the encouragement of the

Protection

weaker — generally the manufacturing — pursuits. The doctrine of incidental protection is to “let alone” so far as the original purpose of legislation is concerned, but would at the same time so shape the tariff that a needed stimulus should be given to certain industries. The limited protectionist agrees with the free-trader in assenting to the proposition that the original condition of industry is found in nature — in the environment of the laborer, also that the necessity for a varied industry is so great, so important to the welfare and independence of a people, as to justify the deflection of human energies by law to certain pursuits which could not be profitably followed but for the fact of protection. This makes a reason for tariff legislation. The weaker industry lives and thrives by the side of the stronger and thus modifies the crude rules of nature by the higher rules of human reason. The protectionist would keep in view the strength and dignity of the State and would be willing to incur temporary disadvantages for the sake of a permanent good. In time, under the stimulus of a protective system, when the industries of the State have become varied and sufficiently harmonized with original conditions, the system of protective duties would become unnecessary. Till that time the industries of the people should be encouraged and fostered by law. The protectionist denies the justice or economy of that system which, in a new country, boundless in natural resources, but poor in capital, would constrain the people to bend themselves to the production of a few great staples for foreign nations to manufacture, while the original producers were left in perpetual vassalage and poverty.

The doctrine of high protection is that the assumptions of free trade are specious and false. The influence of man on his environment is so great as to make it virtually whatever the law of right reason would suggest, namely, that every nation should be independent. Its sovereignty and equality should be secured by every means short of injustice. In order that a State may be independent and able to make out for itself a great destiny, its industries must afford employment for all the talents and faculties of man, and yield products adapted to all his wants. To devote the energies of a people to those industries only which are suggested by the situation or environment is to make a man a slave to nature instead of nature's master. It may be sound reason for the people inhabiting a fertile valley to devote themselves principally to agricultural pursuits; but to do this to the exclusion of other industries is merely to narrow the energies of the race, make dependent the laborer, and finally exhaust those very powers of nature which for the present seem to suggest one pursuit and forbid all others.

Proteids

On the contrary, it is the duty of society to build up many industries in every locality, whatever may be the environment. If nature furnishes no suggestion of blast-furnaces and iron-works then nature should be constrained by means of human law. The production of manufactured products should be so encouraged by tariff duties as to become profitable in all situations. Not only should every State, but every community, be made comparatively independent. Every community should be able, by its own industries to supply at least the larger part of its own wants. This cannot be accomplished in any other way than by the legal protection of those industries which do not flourish under the action of merely natural laws. It is the theory of the high protectionist that every community of men, by means of its varied and independent activities fostered and encouraged by the protective system — should become in the body politic what the ganglion is in the nerve system of men — an independent power, capable of originating its own action and directing its own energies.

The idea of prohibitory tariffs, is that the mutual interdependence of nations is on the whole disadvantageous, and that each should be rendered wholly independent of the other. If in any State or nation certain industrial powers and conditions are wanting, then those powers and conditions should be produced by means of law. Internal trade is, according to this doctrine, the principal thing, and commercial intercourse with foreign states a matter of secondary or even dubious advantage. If the price of the given home product be not sufficient to stimulate its production in such quantities as to meet all the requirements of the market, then that price should be raised by means of legislation, and raised again and again, till the foreign trade shall cease, and home manufacture be supplied in its place. In the endeavor to prepare protective schedules under the system of limited or high protection, it sometimes happens that the tariff is fixed at such a scale as to act as a prohibitory duty, and turn aside entirely the foreign commerce in the article on which the tariff is laid.

Protector, in English history, one who had the care of the kingdom during the minority of the king; a regent; specifically applied to Oliver Cromwell, who took the title of Lord Protector in 1653. In ecclesiology, a cardinal belonging to one of the more important Catholic nations, who, in Rome, watches over questions affecting his country. There are also cardinal protectors of religious orders, colleges, etc.

Proteids, a name given to substances analogous in composition to protein, that is, consisting of carbon, hydrogen, oxygen, and nitrogen, sometimes united with

Protest

sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, syn-tonin, which is the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential food stuffs.

Protest, ordinarily, a solemn affirmation or declaration of opinion (frequently in writing), generally in opposition to some act or proposition; a solemn affirmation by which a person declares either that he entirely dissents from and disapproves of any act or proposition, or else only conditionally gives his assent or consent to an act or proposition, to which he might otherwise be considered to have assented unconditionally.

In commerce, a formal declaration by the holder of a bill of exchange or promissory note, or by a notary public at his direction, that acceptance or payment of such bill or note has been refused, and that the holder intends to recover all expenses to which he may be put in consequence of such non-acceptance or non-payment.

In marine insurance, a declaration made on oath by the captain of a vessel which has met with any disaster at sea, or has been compelled to run into a foreign or intermediate port for safety. The protest should be made as soon as he enters the port, . . . the limit usually assigned being within 24 hours of his arrival.

The word is also applied to a declaration made by a party before or while paying a tax, duty, or the like demanded of him, which he deems illegal, denying the justice of the demand, and asserting his own rights and claims in order to show that the payment was not voluntary.

Protestant, one who protests. In Church history, the name given to those princes and others who, on April 19, 1529, at the second diet of Speyer, protested against the decision of the majority, that the permission given three years before to every prince to regulate religious matters in his dominions till the meeting of a General Council should be revoked, and that no change should be made till the council met. Besides protesting, they appealed to the emperor and to the future council. The diet rejecting their protest, they presented a more extended one next day. Those first Protestants were John, Elector of Saxony; the Margrave George of Brandenburg-Kulmbach; the Princes Ernest and Francis of Brunswick-Lüneburg; the Landgrave Philip of Hesse; Wolfgang, Prince of Anhalt, and the representatives of the imperial cities of Strassburg, Ulm, Nuremberg, Constance, Reutlingen, Windsheim, Memmingen, Lindau, Kempten, Heilbronn, Isny, Weissenburg, Nördlingen, and St. Gall. The name is now extended to all persons and churches hold-

Protestant Episcopal Church

ing the doctrines of the Reformation (*q. v.*) and rejecting papal authority.

Protestantenverein, an association of Protestant ministers, professors, etc., belonging to the "liberal" or advanced school of theology in Germany, formed in 1863 to promote what its members insisted was the spirit of true Protestantism in opposition to what they regarded as reactionary and obscurantist. By the orthodox and conservatives the association was denounced as rationalist or infidel; and though since 1867 it has held annual meetings in various towns throughout Germany, and has several organs in the press of the Fatherland (including the "Protestant Church Journal" and a "Year Book," it and its members have been treated with marked disfavor by the ecclesiastical authorities, membership in the association being, it is alleged, practically a bar to appointments or preferments.

Protestant Episcopal Church, a denomination in the United States directly descended from the Church of England, which doctrinally claims to be based on the Holy Scriptures, as interpreted in the Apostles and other ancient creeds of the Church that have been universally received, and to have kept herself aloof from all the modern systems of faith, whether of Calvin, or Luther, or Arminius, leaving her members free to enjoy their own opinions on all points not represented in the Scriptures as necessary to soul's health, and refusing to be narrowed down to any other creed or creeds than those of the Apostles and the Primitive Church. She claims also to have retained all that is essential to church organization in her episcopate, and in her liturgy to have not only a wise and judicious compend of doctrine and devotion, but also one of the most effectual of all possible conservative safeguards for the faith once delivered to the saints. The characteristic tenets of the Church of England, besides the fundamental doctrines of the Trinity and redemption through the all-sufficient atonement once made for all by the death of Christ on the cross, are a regeneration or spiritual birth in baptism, in which the baptized becomes a member of the Church, and a growth in grace by the use of the sacraments and ministrations of the Church duly administered and duly received, made efficacious by the word of divine truth and the gracious influences of the Holy Ghost, freely given to all who duly seek and faithfully use them. The condition of man after the fall is such that he can do nothing acceptable to God without preventing grace; good works, though pleasing to heaven, have no power to put away sin; works of supererogation, over and above God's commandments, cannot be taught

without arrogance and impiety. The Church has power to decree rites or ceremonies, and to decide matters of faith; the Roman Catholic doctrines of purgatory, invocation of saints, and respect to relics and images, are rejected; clergymen are allowed to marry; and communion is to be given in both kinds. The number of sacraments is two—baptism and the Lord's Supper. Three clerical orders are recognized—bishops, priests, and deacons—the first deriving their office in direct succession from the apostles by episcopal consecration, and the others receiving ordination at the hands of a bishop. Those of the second order are entitled archdeacons, deans, rectors, vicars, or curates, according to their functions. A reader is a layman licensed by the bishop to read in a church or chapel where there is no clergyman. Parson signifies a clergyman in possession of a parochial church.

From the time of the first congregations of the Church of England in America, in 1607, to the close of the Revolution, all the clergy in the colonies were regarded as under the supervision of the Bishop of London. The first American bishop was Rev. Samuel Seabury, who, in 1783, was consecrated in Scotland as Bishop of Connecticut. All Protestant Episcopal churches in the United States are associated in one national body, called the General Convention, which meets triennially. This body is composed of two houses—the House of Bishops, including the bishops of all the dioceses in the country, and the House of Clerical and Lay Deputies. The clergy and laity, composing the House of Deputies, meet and deliberate together; but, when required, vote separately, and sometimes by dioceses. The General Convention directs the manner in which the qualifications of candidates for orders shall be estimated and determined; regulates the particulars in regard to the election and ordination of the orders of the ministry; defines the nature of ecclesiastical offenses, and decrees the punishment thereof; settles the particular form and orders of its common prayer, and publishes authorized editions of the Book of Common Prayer; and directs the mode and manner of its intercourse with foreign churches. In all cases, the House of Bishops has a negative upon the House of Deputies; but when exercised, must be communicated within a limited time to that house. No law or canon can be enacted without the concurrence of both clergy and laity; no man can be introduced into the sacred office without testimonials from both orders; no clergyman be sent to minister where he may not choose to go; no parish be required to receive or continue a clergyman obnoxious to

a majority of the parishioners; no man be punished for any offense not clearly defined by the laws of the Church, nor in any manner but in that prescribed by the same, and never without an opportunity of a trial by his peers. The salaries of the clergy are determined by the mutual agreement of minister and people.

In 1909 the reports of the denomination showed 7,594 churches, 5,272 ministers, and 912,123 communicants. The church has grown rapidly in recent years, and has created many auxiliary agencies for carrying on its expanding work in various fields.

Protestantism, the religious principles and the ecclesiastical system of Protestants. See PROTESTANT; REFORMATION.

Proteus, in the Homeric or oldest Greek mythology, a prophetic "old man of the sea," who tends the sea flocks of Poseidon (Neptune), and has the gift of endless transformation. His favorite residence, according to Homer, is the island of Pharos, off the mouth of the Nile; but according to Vergil, the island of Carpathos (now Skarpanto), between Crete and Rhodes. Here he rises at mid-day from the floods, and sleeps in the shadow of the rocky shores, surrounded by the monsters of the deep. This was the time when those who wished to make him prophesy must catch him. But it was no easy task. Proteus, unlike most vaticinal personages, was very unwilling to prophesy, and tried to escape by adopting all manner of shapes and disguises. When he found his endeavors hopeless he resumed his proper form, and then spoke out unerringly about the future.

Proteus, a genus of perennibranchiate batrachians. One species only has been hitherto discovered, namely the *P. anguinus*, which is found in subterranean lakes and caves in Illyria and Dalmatia. It attains a length of about a foot. The body is smooth, naked, and eel-like, the legs four in number, small and weak, the forefeet three-toed, the hinder four-toed, and, in addition to permanent external gills, it possesses lungs in the form of slender tubes. From its inhabiting places devoid of light the power of vision is unnecessary, and in point of fact its eyes are rudimentary and covered by the skin.

Protevangelium, a very old apocryphal gospel attributed to James, the brother of the Lord; also used of a primitive gospel, from which it has been held several of our gospels were derived.

Proth, Mario, a French writer; born in Sin, in 1832. After having finished his studies at Metz, he went to Paris, where he always showed himself a stanch Republican and violent opponent of the Empire. After the revolution of 1870, he was selected to put in order and publish the cu-

Protococcus

rious "Papers and Correspondence of the Imperial Family," found in the Tuileries. Among his own works are: "To Young People: How to do Battle" (1861); "Love Letters of Mirabeau, Preceded by a Study of Mirabeau" (1863); "A Silhouette of the Revolution" (1864); "The Vagabonds" (1864).

Protococcus, in botany, the typical genus of the family *Protococcidæ*. In one of the two conditions in which it is found it is a spheroidal body $\frac{1}{350}$ to $\frac{1}{10000}$ of an inch in diameter, consisting of a structureless, tough, transparent wall, inclosing viscid and granular protoplasm. It multiplies by fission. In certain circumstances it becomes locomotive. It is found in the mud which accumulates in roof gutters, water butts, and shallow pools. *P. nivalis* is red snow. Dunal says that the crimson color of the salt-water tanks on the shores of the Mediterranean is caused by *P. salinus*.

Protocol, the original draft or copy of a deed, contract, or other document. In Scotland, a record or registry; on the admission of a notary he receives from the clerk register a marked book, called a protocol. In this the notary must insert copies of all the documents he may execute, to be there preserved as in a record. In diplomacy, the minutes or rough draft of an instrument or transaction; the original copy of a treaty, dispatch, or other document; a document serving as the preliminary to diplomatic negotiations; a diplomatic document or minute of proceedings, signed by the representatives of friendly powers in order to secure certain political ends peacefully; a convention not subject to the formalities of ratification. See PEACE PROTOCOL.

Protogine, or **Protogin**, a name used to designate varieties of granite and gneiss, which contain talc or chlorite as a constituent, in place of ordinary mica. Abundant in the Swiss Alps.

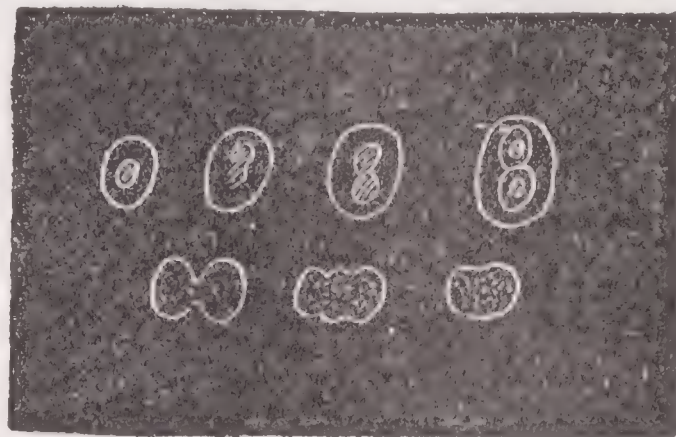
Protogenes, an eminent Greek painter, who flourished about 330 B. C., a native of Caunus, in Caria, a city subject to Rhodes. A considerable part of his life was passed in obscurity, but he was at length brought into notice by Apelles giving a large price for his pictures. On the siege of Rhodes by Demetrius Poliorcetes, Protogenes is said to have continued tranquilly working at his house in the suburbs, and Demetrius spared that part of the city for the sake of the famous artist and his precious works.

Proto-notary, a member of the College of Proto-notaries Apostolic in the papal curia, whose duties are to register pontifical acts, make and keep the records of beatifications, etc.

Protophyths, a name now frequently employed to designate the lowest or simplest organisms in the vegetable kingdom, cor-

Protophyths

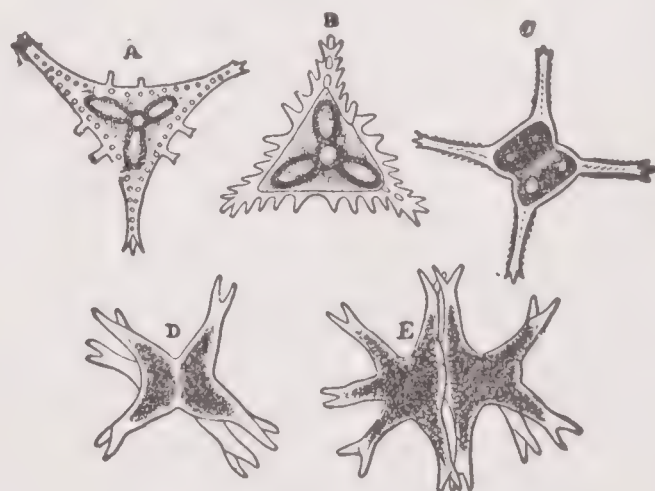
responding to the Protozoa of the animal kingdom. They are regarded as among the Algæ. The life-history of simplest Protophytes is exemplified in the Palmogloea macrococca, a sort of green scum or slime,



PROTOPHYTES.

Development of Palmogloea macrococca.

growing on damp stones, etc. The cells are generally independent, but in some species remain adherent one to another so as to form a filament. Some species have spiny projections of the outer coat, which is of a horny consistence, as in Staurostrum. Others are notched on the sides; some, as the Closterium, are smooth. Many of the Desmids multiply by subdivision, but the plan is modified so as to maintain the sym-



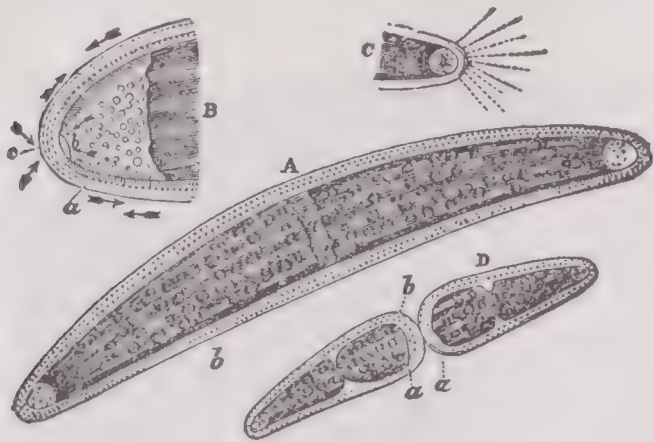
VARIOUS SPECIES OF STAURASTRUM.

A, Staurostrum vestitum; B, Staurostrum acauleatum; C, Staurostrum paradoxum; D, E, Staurostrum brachiatum.

metry characteristic of the tribe. At other times multiplication takes place by the subdivision of the endochrome into granular particles, or "gonidia," set free by rupture of the cell wall. The process of conjugation differs from that of Palmogloea, since each cell has a firm external envelope, which cannot coalesce with another. In Cosmarium, for example, the conjugating cells become deeply cleft and separate, so that the contents pour out freely at first without a protecting membrane. At length it acquires an envelope, and becomes a sporangium, or spore case of reddish brown tint. It is covered with spines, and greatly resembles cer-

Protoplasm

tain fossil forms found in flint, called Xanthidia. The Closteria conjugate after a somewhat similar manner, and it is not un-



ECONOMY OF CLOSTERIUM LUNULA.

A, frond showing central separation, at *a*, in which large globules, *b*, are not seen; B, one extremely enlarged, showing at *a* the double row of cilia, at *b* the internal current, and at *c* the external current; C, external jet produced by pressure on the frond; D, frond in a state of self-division.

common to find a pair in this condition, but many of them are mere simple cells which multiply by division.

Protoplasm, in biology, etc., the living matter from which all kinds of living things are formed and developed, and to the properties of which all their functions are ultimately referred. It was first noticed and described by Roesel von Rosenhof, in his account of the Proteus-animalcule, and was named sarcode by Dujardin in 1835. In 1846 von Mohl gave the name protoplasm to the "tough, slimy, granular semi-fluid" portion of the contents of the vegetable cell. Cohn suggested the identity of vegetable protoplasm and animal sarcode, which was established by Schultze, whose conclusions were probably aided by the researches of De Bary and Koelliker. Protoplasm is a transparent homogeneous, or granular-looking substance. Under high microscopic power, in many instances, it shows a more or less definite structure, composed of fibrils more or less regular, and in some instances grouped into a honeycombed or fibrillar reticulum, in the meshes of which is a homogeneous interstitial substance. The closer the meshes of the reticulum, the less there is of this interstitial substance, and the more regularly granular does it appear. Water, dilute acids, and alkalis cause protoplasm to swell up, and ultimately become disintegrated, and it is coagulated by those substances that coagulate proteids. Its composition is a problem with which science is still to deal.

Protornis, a genus of Passerine birds, with one species, *Protornis glariensis*, from the Lower Eocene Slates of Glaris. It was somewhat similar to a lark, and is the earliest known Passerine.

Protorosaurus, or **Proterosaurus**, a genus of *Lacertilia*, founded by Von Meyer,

Proudhon

to include what was deemed the fossil monitor of Thuringia. The neck is long, the skull of moderate size, the tail long and slender, the teeth sharp-pointed and implanted in sockets, the cervical vertebræ slightly amphiœlous. Two species, *P. speneri* and *P. huxleyi*, from the Permian marl slates of Durham, and the corresponding Kupferschiefer in Germany, are the earliest lizards known. They were six or more feet in length. Owen places them among the Thecodontia, while Seeley thinks they were Dinosaurs.

Protozoa, a group of animals, occupying the lowest place in the animal kingdom. They consist of a single cell, or of a group of cells not differentiated into two or more tissues; incapable, as a rule, of assimilating nitrogen in its diffusible compounds (ammonia or nitrates, or carbon in the form of carbonates). The food is taken into the protoplasm, either by a specialized mouth or by any part of the cell substance, in the form of particles. Prof. Ray Lankester has brought together the results of the latest investigations on the nature of these minute organisms, and adds full bibliography. He divides them into two grades:

1. Gymnomyxa, with seven classes — Proteomyxa, Mycetozoa, Lobosa, Labyrinthulidea, Heliozoa, Reticularia, and Radiolaria.
2. Corticata, with six classes — Sporozoa, Flagellata, Dinoflagellata, Rhynchoflagellata, Ciliata, and Acinetaria.

Protractor, a mathematical instrument, used in drawing or plotting, for the laying down of angles. It is variously shaped, and may be circular, semicircular, or rectangular.

Proudfit, David Law, pseudonym PELEG ARKWRIGHT, an American verse writer; born in Newburg, N. Y., Oct. 27, 1842. His writings have received popular favor. In book form they are: "Love among the Gamins," poems (1877); and "Mask and Domino" (1888). He died in 1897.

Proudhon, Pierre Joseph, a French publicist; born in Besançon France, July 15, 1802. Occupied with rustic labors in his earliest years, he received gratuitous instruction at the college of his native town, and at 19 became a compositor. He was employed in various printing offices till 1837, but had found time to think and study, and make considerable acquirements. The sense of the inequality of conditions among men, and of the social stigma attached to poverty, early weighed on his mind, and gave permanent direction to his speculations and endeavors. In 1840, after several small works, appeared his famous memoir, entitled, "What is Property?" his answer to this question, "Property is Theft," being almost all that is popularly known of him. A second memoir on the same subject exposed him to a prosecution, but he was acquitted. After the revolution of February, 1848, Proudhon became editor

of "The People's Representative," and attracted great attention and popularity by his articles; so that, in June, he was chosen member of the Constituent Assembly for the department of the Seine. But he found no hearing at the tribune, and therefore started a newspaper under the title of "The People," which was suppressed, and reappeared three times. In 1849, he founded his People's Bank, but being soon after sentenced, under the press laws, to three years' imprisonment and a fine, he left France, and the bank was closed by the government. He died in Passy, France, Jan. 19, 1865.

Prout, Father. See MAHONY, FRANCIS.

Prout, Samuel, an English water-color painter; born in Plymouth, England, Sept. 17, 1783. He studied from nature, and sketched with Haydon through Devon and Cornwall, his drawings in the latter county being made for Britton's "Beauties of England and Wales." In 1805 he removed to London, in 1815 was elected to the Water-color Society, and in 1818 went to Rouen by Havre. The picturesque street architecture and fine Gothic remains there made so strong an impression on his mind that afterward his principal works were those in which architecture had a prominent place; and from time to time, in his after career, he made excursions, ransacking every corner of France, Germany, the Netherlands, and Italy for picturesque architectural remains. He died Feb. 9, 1852.

Provancher, Léon, a Canadian priest and naturalist; born in Becancour, P. Q., March 10, 1820. In 1869 he retired from the ministry, and devoted himself to literary work and the study of natural history. He established "Le Naturalist Canadien" ("The Canadian Naturalist") in 1868. His publications include: "Elementary Treatise on Botany" (1858); "Canadian Plant Life" (1865); "From Quebec to Jerusalem" (1882); and "Short History of Canada" (1887).

Provençal, a romance dialect that sprang up in France on the decline of literary Latin. Originally Provençal and Northern French came from the same stock, but by the 12th century they differed almost as widely as French and Italian. Owing to its rhyming facilities it was essentially the language of the troubadors and extended over the area from the Alps to the Pyrenees and the Mediterranean to the Loire, as well as in parts of Spain and Switzerland. Among the earliest compositions in Provençal were the epic romances, treating of the semi-mythical deeds of Charlemagne and King Arthur, from which were developed all the subsequent Carolingian and Arthurian legends. The drama was almost entirely ignored by the troubadors, the only examples being of a religious character as

the "Mystery of the Passion," and the "Marriage of the Virgin"; but in lyric poetry Provençal has made a lasting contribution to the literature of the world.

The first historic Provençal author was Guillem IX., Count of Poitiers, who lived toward the end of the 11th century. The following 150 years was the most brilliant period of the troubadors, and marked the highest development of Provençal. Among the most important poets were Arnaut de Marueh, Giraut de Dornelh, Arnaut Daniel, and Guiraut Riquier, called "the last of the troubadors." With the 13th century the real literary Provençal disappeared, but in the 19th it was again revived by such poets as Jacques, Jasmin, Romanille, Mistral, and Aubanel, who started a movement for the preservation of Provençal languages and customs. See TROUBADORS.

Provence, formerly a maritime province of France, bounded on the S. by the Mediterranean, and comprising the modern departments of Bouches du Rhône, Var, Basses-Alpes, and parts of Alpes Maritimes and Vaucluse. It included a portion of the Roman province of Gaul generally called simply Provincia ("the Province"), whence it derived its name. The Provençal tongue, however, was spoken over a much larger area. Provence was overrun in the 5th century by the Visigoths and Burgundians, for a time was under the Saracens, and in 879 was mostly incorporated with Cis-juran Burgundy and with it was attached to Germany. The main part of the region remained, however, under the Counts of Arles, also known as Counts of Provence, and was practically independent. Early in the 12th century the countship passed by inheritance to Raymond Berengar, Count of Barcelona, and under the protection of his successors Provençal poetry attained its zenith. In 1245 the last count died, and the inheritance passed, through his daughter, to her husband, Charles of Anjou, who united Provence with Naples. Under the Angevin princes the constitution of Provence, with its three estates holding the power of the purse, was well balanced and free; and it is possible that through Simon de Montfort the English parliamentary constitution may be indebted to it. The last of the counts, Charles, grandson of René the Good, bequeathed his country to the dauphin of France; and it was united to that country in 1486 by Charles VIII.

Proverb, an old and common saying; a short or pithy sentence often repeated, and containing or expressing some well-known truth or common fact ascertained by experience or observation; a sentence which briefly and forcibly expresses some practical truth. Unless a saying is capable of being applied to a variety of cases it can never become a proverb. Lord Palmerston's famous dictum, "Dirt is only matter in the

wrong place," has sense, salt, and shortness, but it will never be a proverb.

A wise man's saying may be ever so wise, pithy, and pointed, but it is only his saying; and nobody is bound to take it as a settlement of any question. The proverb, on the other hand, has been adopted time out of mind and stamped by common consent as the recognized expression of public opinion. It has thus become by prescription a legal tender in controversy, while the other is only the check of a presumably solvent capitalist. In this respect proverbs and ballads are on precisely the same footing. They derive their authority from popular suffrage, and take their stand not as the issue of this or that man's brain, but as the adopted utterances of the people at large. But there is this difference between them, that the ballad had a maker, whoever he may have been, but no man ever yet made a proverb. He may have made the original saying, but the forces that made it a proverb were entirely beyond his control. No man by taking thought can add one proverb to his language any more than one cubit to his stature.

It would be a mistake, however, to fancy that every proverb must have had its germ in some wise or shrewd remark. Some are fables in little, or the concentrated essence of fables; and, as might be expected, a large number of the proverbs of the East, the birthplace of the fable, are of this sort. Every Oriental collection abounds in proverbs like "The ant got wings to her destruction." "They came to shoe the Pasha's horses, and the beetle held out his foot," "They asked the mule, 'Who is thy father-?' 'The horse,' said he, 'is my maternal uncle.'" By purists, perhaps, these and others of the same species, including the familiar "pot and kettle," may be denied a place among the proverbs proper; but they fulfil all the functions of the proverb, and they serve moreover to show how near akin are these two venerable vehicles of old-world wisdom, the fable and the proverb. Nor is the proverb of necessity the wit of one. Sometimes it is the simplicity or naïveté of one, and the wit lies in the application of it by the many. The Viennese have a good specimen of this kind. The late Emperor Ferdinand, driven for shelter one day into a peasant's house, took a fancy to some dumplings that had been just cooked for the family supper. The court physician, being responsible for the imperial digestion, remonstrated, but his majesty's gracious answer was "*Kaiser bin i', knödel muss i' haben*" ("Emperor I am, dumplings I'll have") which became in course of time a recognized comment in cases of pertinacity. Here we have what is very rare, a proverb traced to a definite source; a few instances there are like "A bridge of silver for a flying foe," which

was, it is said, a saying of the "Great Captain," Gonsalvo de Cordova; but as a rule the proverb is a scrap of unfathered wit or wisdom that came into the world nobody knows how. And here, too, we have a proof that though many regard the proverb as a mere fossil, there is still vitality in it. No doubt modern society has recourse to proverbs in conversation much more sparingly than was usual in the days of our forefathers, and the reasons are plain enough to see. To accept a proverb as an answer implies deference to authority and is in effect an acknowledgment of the wisdom of our ancestors. There is necessarily an antagonism between the proverb and individualism or self-assertion or self-conceit, or whatever other name we may choose to give it. The office of the proverb is to hit the nail on the head, to put the matter in a nut shell, to bring back discussion to the point at issue, to check prolix argumentation. In all languages it condemns loquacity and commends silence. In the nature of things, therefore, it is impossible that the proverb should be popular among the worshipers of excellent speech.

The Celtic races, it may be observed, never greatly favored proverbs. But for all that proverbs are very far from being the dry bones they are sometimes supposed to be. If any one took the trouble to register carefully all the proverbs or references to proverbs that came under his notice in the course of a day, he would find probably that they enter into our daily speech to a much greater extent than he had suspected. We are apt to use proverbs automatically. So completely have they engrafted themselves that we talk of gift horses, and half-loaves, and a bird in the hand, and sauce for the goose mechanically and without any thought of speaking proverbially. There is no family, perhaps, that has not proverbs or rudimentary proverbs of its own, founded on some adventure or drollery or blunder of one of its members, and used proverbially by all, often to the perplexity of the uninitiated visitor; and what is true of the family is true of the community on a more extensive scale. It has its own current sayings, allusions, comparisons, similitudes, incomprehensible to the outsider, but full of meaning to all who are to the manner born. Of these there will be now and then one more generally applicable and negotiable than the rest, with more of the true proverb metal and ring in it, which in time will pass the bounds of the community and become the property of the nation. A man sees another bolting out of his house, and asks what he has been about there. "You'll see when the eggs come to be fried," says the other, making off; which is explained when it is time to fry the eggs and it is found out that the frying-pan has been stolen. It will be first a family joke; then

a parish joke; then a stock saying in the market place — “very good; time will tell; you’ll see when the eggs come to be fried”; then a saying in many market places; and so at last a proverb.

As they pass from the family and the community to the nation, so they pass from one nation to another. The purely national proverbs form only a portion of the proverbs in any language. It almost seems as though there had been from time immemorial a kind of proverb exchange through which any serviceable proverb in one language passed into any other that stood in need of it; and this makes it a matter of difficulty, or rather impossibility to settle the nationality of many of the best and most familiar. We are not, however, to jump at once to the conclusion that proverbs which are identical or nearly so must be in every instance merely versions or variants of one common original. But undoubtedly in most cases of widely distributed proverbs the probability is on the side of a common ancestor. It is not easy, for instance, to see how that one about the gift horse’s mouth, which was, as we know, “a vulgar proverb” in the time of St. Jerome, could ever have been independently produced. That two minds should hit on precisely the same illustration for the same thought may be within the bounds of possibility, but that in each case a proverb should be the fruit of it pushes the coincidence to the utmost limits of chance.

It is obvious that the greater number of these proverbs which seem to be common property must be of eastern birth. If we find a proverb in English, German, Italian, and Spanish, and also in Arabic, Persian, and Hindustani, which is the more likely — that it has passed from Europe to Asia, or from Asia to Europe? A wide distribution argues antiquity, for necessarily the proverb travels slowly; and, go back as far as we may, we find the proverb, the fable, and the parable working together in the East. When David appealed to Saul it was with “a proverb of the ancients,” and it was with proverbs that the prophets drove home their words, proverbs that are, many of them, in use there to this day, like “As is the mother, so is her daughter,” and “The fathers have eaten sour grapes, and the teeth of the children are set on edge.” The sayings of “them of old time” cited in the Sermon on the Mount — “Judge not that ye be not judged,” “The straw in another’s eye thou seest, but not the beam in thine own,” and others, are still current in Syria. “One sows and another reaps” and “Who makes a trap for others falls into it himself” are Turkish, and “Where the corpse is there the vultures will be” is a Bengali proverb. The proverbs that are strictly national have an interest of another kind. Coming directly from the people, the chosen vehicles of

their sentiments and opinions, they naturally reflect the habits of thought, the turn of mind, the way of looking at things that prevail among those who use them.

Any one at all versed in comparative paræmiology will be able for the most part to make a shrewd guess at the original language from a translated specimen. They reflect other things, too — often the history of the nation they come from. The Spaniard, as he was before Ferdinand and Ximenez bridled Aragon and Castile, makes himself heard in “The king goes as far as he may, not as far as he would”; there are Teutonic proverbs older than Luther, in which his very spirit seems to speak; there are Italian proverbs that, in their cynicism, distrust of mankind, and open advocacy of lying, are more eloquent on the state of society in mediæval Italy than any of her historians. And the differences they suggest are often curious. The devil figures prominently in the proverbs of Europe; but in those of the Latin races he is always treated with respect, or at any rate credited with astuteness, the only exception, perhaps, being the Italian one that accuses him of weaving a coarse web. In Teutonic proverbs, on the other hand, he is held up to ridicule on the score of his amazing simplicity. He tries to get wool off his pigs; he takes a donkey for a cow, and remarks how soft its horn is; he sits down on a swarm of bees, because where there is singing going on one may make one’s self easy; and so on through a host of proverbs that give a very poor idea of his intellect.

Of the national groups the Spanish is unquestionably the most remarkable. The number of Spanish proverbs is prodigious. In any other language 5,000 or 6,000 would be a large collection, but a Spanish MS. by Yriarte, the royal librarian, which was in the Heber library, contained between 25,000 and 30,000, a number which, however incredible to others is not at all surprising to those who know the proverbial aptitudes of the people and the language. In Spain almost everything has its proverb; every village of the plain, every herb of the field, has its virtues or vices put in a compendious shape for general circulation. And they are as racy as they are numerous, full of shrewd sense and knowledge of human nature, and rich in that grave, dry Spanish humor which never compromises itself by a descent into facetiousness. The Spaniard is, no doubt, naturally sententious, but the facilities offered by his rich, sonorous Castilian should not be overlooked; and among them must be reckoned its wealth in rhymes, consonant and assonant, of which there is such striking proof in the number and excellence of the Spanish rhyming proverbs. Language, it may be observed, plays an important part in proverbs. Take, for example, the Scotch “Better a toom house

Proverb

than an ill tenant." Compared with the English "empty," how much more effective is the Scandinavian "toom," to say nothing of the alliteration or inverted rhyme. The Basque proverbs, from which several of the Spanish are obviously derived, are of much the same character; and in both, but especially in the Basque, the resemblance to the proverbs of the East is very distinct. The Basque proverbs have not been as carefully collected as they deserve, and of course form only a small group; but, relatively to the Euskara-speaking population of a little over half a million, their numbers indicate a propensity to the use of the proverb as strong as the Spaniard's.

The Italian proverbs, only less numerous than the Spanish, are more remarkable for wit, often bitter, than for humor; in the French, on the other hand, there is little or none of that brilliant wit and epigrammatic neatness of expression which distinguish French literature. But this is only what might be expected. French wit is the product of French culture, and proverbs are natural productions. English, including the Lowland Scotch, must be regarded as simply a subdivision of the great Teutonic group comprising the German, the Plattdeutsch, the Dutch, the Danish, the Swedish, and the Norwegian. Each of these has, of course, its own peculiar proverbs, but in each case the main body, it will be seen on comparison, belongs to a common stock. Next to Spain, the region richest in proverbs in Europe is probably that watered by the lower Elbe, and including Oldenburg, Hanover, Holstein, and Mecklenburg—the Anglo-Saxon country, in fact. Compared with other groups, the Celtic proverbs must be rated as poor. The Gaelic proverbs, as Nicolson's admirable collection shows and he himself admits, have been largely recruited from Norse and Lowland Scotch sources; and the purely Celtic are to a great extent made up of sayings in praise of Fingal, or expressive of the opinion which one clan has of another, or of itself. The Welsh proverbs gathered by Howell are very flat; and of the Irish Dr. Nicolson observes that the wonder is they are so few, and those few so remarkably deficient in the wit for which our Hibernian cousins are specially distinguished—a remark certainly borne out by the specimens usually given, in which moral truisms of the copy book order, like "virtue is everlasting wealth," "wisdom excels all riches," "falling is easier than rising," have a decided predominance. Among the Oriental proverbs the Arabic hold the first place in respect to quantity, and perhaps quality likewise, but the Persian and Hindustani are also excellent, and in the Turkish, together with abundant worldly shrewdness, there is sometimes a vein of poetry that is very striking. It is questionable whether the "tender beauty," to use

Proverbs of Solomon

Trench's praise, of the English proverb of the shorn lamb is not rivalled by its Turkish parallel, "God makes a nest for the blind bird."

Proverbs of Solomon, one of the sacred books of the Old Testament ascribed to Solomon. The Hebrew term translated proverbs means literally a similitude or comparison of two objects, and this is the form that most of them take. Solomon, we are told, uttered 3,000 proverbs; but it has been doubted whether he ever made any collection of them in writing; and it is expressly stated that the latter part of the book, beginning with chapter xxv., was written and added by order of King Hezekiah. The title shows the author rather than the compiler. It has hardly ever been contended that a large share in the composition of the book is to be ascribed to the Wise King; and the divine authority of the book is sufficiently proved by the quotations made from it in the New Testament. In all ages this book has been regarded as a great store house of practical wisdom. It naturally divides itself into several parts. The first seven verses of the first chapter may be regarded as a heading to the rest of the book. Then begins the first part, which constitutes a sort of proem or exordium, and closes with the end of the ninth chapter. It may be described as a series of connected admonitions in a sententious form, written in the highest style of poetry, and adorned with apt, beautiful, and striking illustrations. Wisdom is here personified with indescribable majesty and grace, and love is here inculcated, and her rewards set forth, together with the pernicious consequences that follow her rejection. The second part, which constitutes the chief portion of the book, and is the strictly proverbial portion, extends from chapter x. to xxii: 16. The proverbs, about 400 in number, contain moral precepts and rules of life for every age and class of men in a clear, sententious form. Generally, one proverb is comprised in one short verse of two members or classes, forming a parallel opposition to each other. Except in a few cases, the grouping appears to be accidental. "They may be compared to so many jewels, put together without any visible order or connection, but each shining with its own peculiar beauty; a beauty which is increased rather than obscured by this apparently accidental association of one with another." With chapter xxii: 17, a kind of appendix begins, introduced by a separate heading. The proverbs of this section generally consist of two verses, and sometimes of three, are constructed with less regularity, and often without any parallelism. A second appendix begins at chapter xxiv: 23, denoted by the heading, "These things also belong to the wise." The second main collection begins with chapter xxv., introduced with the

heading, "These are also proverbs of Solomon, which the men of Hezekiah, King of Judah, copied out." The proverbs here, as in the former part, generally consist of one verse of two parallel opposing members; but they are less plain and intelligible, and frequently obscure. They extend over five chapters. The 30th chapter contains the words of Agur, and the 31st the counsels addressed to King Lemuel by his mother. Who these persons were is not known. That Lemuel is another name for Solomon is conjecture that has little of probability to support it.

Providence, a city, capital of the State of Rhode Island, and county-seat of Providence co.; on the Providence river, an arm of Narragansett Bay, and on the New York, New Haven, and Hartford, and the New England railroads; 44 miles S. W. of Boston. It is the second city of New England in population and wealth, and is built on a rolling plateau.

Business Interests.—Providence has upward of 2,000 manufacturing establishments, with a combined capital of about \$60,000,000; and employing about 40,000 persons. It is noted for its manufactures of cotton and woolen goods, jewelry, and stoves, and is the largest seat of fine jewelry manufacture in the United States. The other industries include silverware, tools, engines, locomotives, boilers, sewing machines, screws, files, general hardware, yarn, calico, laces, braids, worsteds, broadcloth, chemicals, etc. There is an extensive coastwise commerce and shipping industry, especially in the coal, cotton, and wool trade. There is also an important shell-fish industry. Lines of steamboats run regularly to Boston, New York, Philadelphia, and Baltimore. There are 19 National and several other banks; and many daily, weekly, and monthly periodicals. The assessed property valuations exceed \$192,800,000, and the total bonded debt is \$16,800,000, net debt \$14,000,000.

Public Interests.—The city has an area of 19 square miles; 224 miles of streets, of which 40 miles are paved; a system of waterworks, owned by the city, that cost nearly \$6,500,000, with 325 miles of mains; and a sewer system covering 175 miles. The streets are lighted by gas and electricity, at a cost of over \$280,000 per annum; the police department costs annually about \$365,000, and the fire department about \$350,000. There is a public school enrollment of over 22,000 pupils; and an annual expenditure for public education of over \$664,000. The cost of maintaining the city government exceeds \$4,190,000. The death rate averages 19.75 per 1,000. Providence is the seat of BROWN UNIVERSITY (*q. v.*), St. Mary's Lsalle, and St. Xavier's Academies (R. C.), Lincoln School, Academy of the Sacred Heart, Rhode Island School of Design, etc.

The charitable institutions include the Rhode Island Institute for the Deaf, Dexter Asylum for the Poor, Home for Aged Men, Home for Aged Women, State Home and School for Indigent Children, Rhode Island Hospital, Butler Insane Asylum, orphan asylums, dispensaries, etc. There is also the Rhode Island State Prison. There are about 120 churches, and several beautiful parks, the most important being the Roger Williams.

History.—In 1636 Roger Williams, a Baptist clergyman, was exiled from Massachusetts because he opposed its theocratic laws. He first settled at What Cheer rock, on the Seekonk river, and later at the head of the Providence river, where the Indian chief, Canonicus, granted him a piece of land. In 1643–1644 local government was formed under a royal charter. In 1675, during King Philip's War, the city was partly burned. Providence received its city charter in 1832. Subsequently Cranston and North Providence were annexed, and a part of the town of Johnson in 1900. Pop. (1900) 175,597; (1910) 224,326.

Providence Public Library. As a model public library in a city of moderate size, we may take that of Providence, newly housed at a cost exceeding \$450,000, of which more than \$260,000 was a gift from the late John Nicholas Brown. Unlike the New England rule its maintenance is only in part municipal, with a constant stream of gifts testifying to the esteem and affection of its public. This institution is chosen because it incorporates the best modern practice in its administration with some original features of great merit, the whole conducted with a courtesy, an enlightened helpfulness not exceeded in the world.

First as to its architecture: the plans were worked out in daily consultation with the librarian, William E. Foster; the intention has been to design rooms of such form and size as will best accommodate the various departments of the library, and so group these together as to promote the convenience of the public and the efficiency of the staff. Instead of the old-time method of beginning with an ornamental shell, and disposing the interior to fit that shell, the interior has first been carefully thought out and then an exterior of great beauty has enwrapped it, discovering, as in so many other cases, that beauty may be the natural efflorescence of utility. As becomes a public building in a thriving and wealthy city, the materials throughout are rich and the decoration sumptuous, presenting withal an unceasing lesson in that good taste which is the prime element in good art. The hazard of fire is minimized by disposing the boilers for heat and power in a separate building, and by a construction throughout

of fireproof marble, stone; and encased steel; the lighting is electric, preserving the purity of the air; the successive floors of the book stacks are of thick glass to promote cleanliness and diffuse light. Swift electric lifts convey the books from four of the stack stories. When a volume is to be dusted it is struck over a bell-mouthed tube, through which a quick exhaust bears away every particle of dust.

From the handsome vestibule, we enter the large room devoted to children. The best books for the young are ranged on its shelves, and the tables are covered with illustrated magazines and papers. A lady of tact and training is in charge to aid the young folk in selection, and to answer the questions they are invited to ask,—a privilege freely exercised when their reading has to do with their lessons. Month by month collections of books on birds or trees, on foreign lands or local history, are placed on the shelves, with intent to put a uniting thread through reading which otherwise might be haphazard and desultory.

Adjoining this large room for children is a smaller apartment where, on giving due notice, a teacher may bring her class and find on a table the chief books in the library bearing on the theme of study, while the walls display every map and picture available for the elucidation of the subject.

We pass now to the main library. Its very full reference department is freely accessible; it contains many catalogues to tell the inquirer in what other libraries he may find books not to be had here. By a judicious plan, this library together with those of the Athenæum and of Brown University coöperate in their purchases, so as not to duplicate costly works seldom in demand; the three institutions jointly publish a monthly bulletin of accessions and other useful information. Beyond the limits of the Providence libraries Mr. Foster exerts himself to procure loans from larger collections, whether in Boston, Washington, or elsewhere. This method is gradually becoming more and more general throughout the Union, so that today the common store of literature held by public, university, and State libraries is measurably at the service of a student anywhere in the land.

Opening from the main library is the periodical room. Here the shelves for the racks rise directly from the floor economizing space where space is precious. The magazines equally with the filed newspapers are hospitably at the disposal of the public.

We return to the library proper and find its most striking department to be industrial. Providence is a city famous for its varied and ingenious manufactures; its machinery, machine tools, measuring instruments, silverware, and textiles are exported

to every quarter of the globe. Every industry in the city has been canvassed with a view to its promotion by this library. Here are costly books of design from Paris, Berlin, and London to afford an architect an unhackneyed piece of decoration, or suggest to an inventor a better arrangement for a loom. Here, too, are beautifully illustrated books on birds, insects, flowers, and shells, abounding with hints to the devisers of new patterns and unwonted embellishments. These artists, indeed, are now asking for pictures of crystals and gems, for the revelations of the microscope and the polariscope, that nothing in air, earth, or ocean may be wanting in their quest for quaint and novel motives. For the convenience of copiers a draughting table is provided; near by is a dark room for the easier and speedier reproductions of the camera.

Noteworthy among the industrial books are the trade catalogues; these are issued as advertisements pure and simple, but none the less they contain much trustworthy information, a great deal of it not to be had elsewhere, and the illustrations are usually capital. The concerns which publish these books are beginning to charge for them, and many of them are well worth buying, as for instance, the volumes which recite how the pressure blower is supplanting the tall chimney, and how aluminum is manufactured by electricity for uses as diverse as those of soup kettles and the circuits of telegraphy.

All that Mr. Foster has done to promote the industries of Providence he has repeated for every other interest of the city. Every historical, scientific, literary, artistic, educational, or philanthropical society within the gates of Providence can find its best and most helpful literature within these walls, to the end that the library may be the rallying ground and center of all that makes for the culture and advancement of the community. In this important matter of a careful adaptation of the contents of his shelves to the wants and needs of his public, Mr. Foster has followed in the steps of that Nestor of American librarians, Mr. S. S. Green of Worcester. Let us now examine a distinguishing feature of the Providence library, original with Mr. Foster, and also deserving unqualified praise.

One of the handsomest rooms in the building, richly and quietly furnished in carved mahogany, much resembles the private library of a scholar of wealth and taste. This displays Mr. Foster's "Standard Library," a collection of less than 1,000 of the greatest books of all time, few of them less than 50 years old, all in the best editions, and many of them with rare and authentic portraits. The purpose throughout has been to present the literature of power as distinct from books of either information or entertainment. Here are Chaucer, Bacon,

Shakespeare, Spencer, Milton, Burke, Tennyson, and Thackeray; Homer and Sophocles; Vergil and Horace; Goethe and Schiller; Dante and Tasso; and their peers—all with a free invitation to be taken down and read. In the circulating department these masterpieces are to be had in duplicates, but the splendid impulse of this throne room of letters is directed to whoever is forming a library of his own. A book never does us so much good as when we possess it—when we are free to take it up next month or next year—when we infringe no rule as we mark its nubby passages, or refer on the fly-leaf to the pages we mean to reread. Of golden value then are the intimations of such a store as this, winnowed by that patient breath of time which at last unerringly divides the literature of the ages from the books of a day.

Let us now pass to another feature of the Providence library not, as far as I know, developed so fully elsewhere. Mr. Foster has observed the attraction conferred by timeliness upon a book or an article. He knows that what makes newspapers popular is news, and that the vogue enjoyed by an informing book largely turns upon its treating a question of the hour. Accordingly for several years past he has noted every morning the theme uppermost in the public mind,—whether a presidential canvass, a threatened strike, or aught else; he then has drawn up a list of every important book, report, pamphlet, or article in his library bearing on that topic; and the list has been posted in the main room and published in the local press. In this thoughtful fashion much of his store goes into active circulation instead of gathering dust on the shelves; while the public of Providence has a special opportunity to be well-informed on current questions where, often enough, much first-hand evidence is in danger of being overlaid by later but less reliable testimony. In addition, Mr. Foster often chooses themes of more than fleeting interest, as Paris and the Exhibition, or American Colonial Architecture, and focuses light upon them from sources all but forgotten.

Just as we leave the building we enter for a moment the handsome hall in which lectures and addresses on literary themes are given. At a touch a broad white sheet may be lowered for stereopticon illustrations. The walls are covered with strong burlap, to bear photographs and other pictures as one exhibition succeeds another in a round of informing delight.

Provisional Order, an order granted, under the powers conferred by an act of Parliament, by a department of the government, by the Secretary of State, or by some other authority, whereby certain things are authorized to be done which could be ac-

complished otherwise only by an act of Parliament. The order does not receive effect, however, till it has been confirmed by the Legislature. Till that time it is purely provisional; and even after it has been so confirmed and is in reality an independent act, it retains the title of a provisional order. Provisional orders are most useful in facilitating the modification or extension of the provisions of general acts, so as to adapt them to the special necessities of particular districts. They may be obtained with much greater expedition and less cost than a private bill; the confirmatory act when unopposed may be obtained in a week or two, and has all the facilities of a government measure.

Prudden, Theophile Mitchell, an American bacteriologist; born in Middlebury, Conn., July 7, 1849. He was Professor of Pathology in the College of Physicians and Surgeons, New York. His works include: "Handbook of Pathological Anatomy and Histology" (1885), with F. Delafield; "Story of the Bacteria" (1889); "Dust and its Dangers" (1891); "Water and Ice" (1891); "An Elder Brother to the Cliff Dweller" (1897); "Under the Spell of the Grand Cañon" (1898); etc.

Prud'homme, a skillful or discreet man; specifically, in France, a member of a board composed of masters and workmen whose office is to arbitrate in trade disputes. They existed as early as the 15th century, and were revived in France by Napoleon I. in 1806. The expression is used for the typical French citizen; Jacques Prudhomme answering to the English John Bull.

Prudhon, Pierre, a French painter; born in Cluny, France, April 4, 1758; studied art at Dijon and in Rome, where he came under the influence of Correggio and of Leonardo. He latterly settled in Paris, where he gradually made his way, and at length became famous by his "Truth descending from Heaven," "Psyche carried off by Zephyr," "Crime pursued by Justice and Divine Vengeance," etc. His importance consists in the fact that, in opposition to David, he accentuated the purely pictorial element and the effect of light in his works. He died in Paris, Feb. 16, 1823.

Prune, the dried fruit of *Prunus domestica*, especially of the varieties called St. Catherine and green gage. They contain a large proportion of sugar, etc., so that brandy can be distilled from them. Used as a condiment and as a domestic laxative medicine, but they are apt to gripe.

Prusa. See BROUSSA.

Prussia, the largest and most powerful State of the German empire; occupying a N. central portion of the European continent; between lat. 40° and 56° N., and lon.

6° and 23° E.; bounded on the N. by the Baltic and Denmark; on the E. by Russia and Poland; on the S. by Bohemia, Bavaria, Württemberg, and Baden; and on the W. by Belgium and the Netherlands. From the extreme E. frontier of Prussia to Aix-la-Chapelle, the distance is about 775 miles, and from the promontory on the Baltic above Stralsund, to the extreme S. frontier of Silesia, the distance is 404 miles. The length of the coast line is about 250 miles on the North Sea, and 750 miles on the Baltic. The Duchy of Lauenburg belongs to the King of Prussia, but it is not consolidated with the monarchy. The following islands belong to Prussia: Rügen, Fehmarn, Alsen, Heligoland and the Frisian Islands. Total area of the kingdom, 136,076 square miles; pop. (1910) 40,157,573.

Political Divisions.—Prussia is administratively divided into 14 provinces, which are again subdivided into 35 government districts, with the principality of Hohenzollern, the cradle of the royal family. The provinces are as follows, with population in 1905: Rhine (Rheinland), 6,436,337; Silesia (Schlesien), 4,942,611; Brandenburg, 3,531,906; Westphalia (Westfalen), 3,618,090; Saxony (Sachsen), 2,979,221; Hanover, 2,759,544; East Prussia (Ostpreussen), 2,030,176; Posen, 1,986,637; Hesse-Nassau, 2,070,052; Berlin, 2,040,148; Pomerania (Pommern), 1,684,326; West Prussia (Westpreussen), 1,641,746; Schleswig-Holstein, 1,504,248; Hohenzollern, 68,282—total, 37,293,324. The principal cities were: Berlin, 2,040,148; Breslau, 470,904; Cologne, 428,722; Frankfurt-on-the-Main, 334,978; Düsseldorf, 253,274; Hanover, 250,024; Magdeburg, 240,633; Charlottenburg, 239,559; Essen, 231,360; Stettin, 224,119; Königsberg, 223,770.

Topography.—The surface of the kingdom is generally level, sloping in the N. to the sea, and forming part of the great N. plain of Europe. The S. and S. W. parts of the kingdom are hilly, or even mountainous. The principal ranges are the Sudetic, the Thuringian, the Hartz, the Teutoburgerwald, the Weser, the Taunus and the Westerwald. The province of Hohenzollern is in the Swabian Alps. Prussia is well watered. The Rhenish provinces are traversed by the Rhine, while the E. frontier is partly formed by the Weser. The Elbe intersects the Saxon provinces; the Oder, which is almost entirely a Prussian river, runs through the whole extent of the monarchy, from the S. frontier of Silesia to the Isle of Usedom, where it falls into the Baltic. Polish Prussia (or Posen) is watered by the Wartha; Western Prussia by the Vistula; and Ducal, or Eastern Prussia by the Pregel and Niemen. Besides the above, there are many other large streams, as the Ems, Moselle, Spree, Havel, Netze, etc. Owing to

the flatness of the country through which they flow, none of the great rivers are interrupted by cataracts, and they are all navigable—the Rhine, Elbe, and Vistula, throughout their whole course in the Prussian dominions; the Oder for barges as far as Ratisbon in Southern Silesia, and the Regel and Niemen to a considerable distance inland. Lakes are exceedingly numerous, particularly in Eastern Prussia and Pomerania. There are also along the coast several large bays, or rather lagoons, communicating with the sea by narrow mouths, and possessing more of the character of freshwater lakes than of arms of the sea. They are denominated *haffs*. The climate of Prussia is not less varied than the soil. Along the Baltic it is moist, and in Eastern Prussia, especially, the winter is long and severe. It is also harsh in the S. part of Silesia, Brandenburg, and the Saxon and Rhenish provinces, it is comparatively mild. The quality of the soil is various. In Brandenburg and Pomerania it is generally poor; in many parts, indeed, it consists of tracts of loose barren sand, diversified with extensive heaths and moors; but, in other parts, particularly along the rivers and lakes there is a good deal of meadow, marsh, and other comparatively rich land. In Ducal Prussia and Prussian Poland, including the province of Posen, the soil consists generally of black earth and sand, and is, in many parts, very superior; but Silesia, and the Saxon and Rhenish provinces, are naturally, perhaps, the most productive. The plain of Magdeburg, on the left bank of the Elbe is also very fertile.

Agriculture and Stock Raising.—About 28,479,800 hectares are under cultivation. Large estates are generally managed by stewards and the occupants of smaller properties are, in most cases, the owners. Rye, wheat, barley, oats, potatoes, beet root, flax, hops, tobacco and hemp form the chief products. Chicory is also largely cultivated. The extensive beet root plantations give rise to one of the most important industries; in 1898 there were 312 establishments manufacturing beet root sugar. Madder and other plants used in dyeing are also raised. Fruits and vegetables are most extensively grown in the W. provinces, which are also famous for their wines. Horses, cattle and sheep are extensively raised, wool being an important product. Large numbers of fine horses are exported from East Prussia.

Mining.—The mineral products are abundant, coal being the most important. The production of lignite is large. Copper, iron and lead are extensively worked. Prussia yields about one-half of the world's annual production of zinc. The total value of the mining products in 1898 was \$19,445,344.680.

Manufacturing.—Though more of an agricultural than a manufacturing country,

Prussia has greatly distinguished herself, particularly of late years, in various branches of manufacture. The Rhenish provinces, and Saxony and Silesia, are the districts most prominent in this industry. Linens and coarse woollens for domestic consumption are made in every village, and, indeed, in most cottages throughout the kingdom. Large quantities of silk and cotton goods, and linen, are produced in Elberfeld, and other towns of the Rhine provinces. Very superior broadcloth is largely manufactured at Eupen, Malmedy, Berlin, and Aix-la-Chapelle. Prussia occupies an advanced rank as a producer of the useful metals. The articles of hardware made at Berlin, Iserlohn, Hagen, Solingen, Olpe, and Essen enjoy a high reputation, the last-named place being the seat of the famous Krupp steel and gun works. Porcelain, jewelry, watches, and carriages are also manufactured in the latter city on a most extensive scale. Paper, leather, soap, oil and cigars are important manufactures; and beer and spirits are very extensively produced.

Commerce.—Commerce is facilitated by the long coast line, and by an elaborate system of railways and canals. The railways are gradually coming under the control of the State. In April, 1899, the number of miles open for traffic was 32,351, not including the narrow gauge State railways and short lines owned by private individuals. The BALTIC AND NORTH SEA CANAL (*q. v.*) is of especial service in the development of commerce, both foreign and domestic. There are 88 chambers and corporations of commerce in the large towns of the kingdom. There are no separate statistics for the trade of Prussia; they are included under those of the German empire.

Education.—Throughout the kingdom, education is general and compulsory for the elementary grades. The school age is from 6 to 14 years. In 1898 the institutions for secondary education were as follows: Universities, 11; classical and scientific high schools (gymnasias and realschulen), 578; public normal schools (1897), 126.

Religion.—Absolute religious liberty is guaranteed by the constitution. Nearly two-thirds of the population are Protestants and most of the remainder, Roman Catholic. The State Church is Evangelical or Protestant, and since 1817 has consisted of a fusion of the Lutheran and Calvinistic bodies. The relations of the Roman Catholic Church to the government differ in the various provinces, but in every part of the monarchy the crown reserves to itself control over the election of bishops and priests. The higher Catholic clergy are paid by the State.

Government and Finances.—The constitution vests the executive and part of the legislative authority in a king who attains his majority on accomplishing his 18th

year. The crown is hereditary in the male line, according to primogeniture. The king is advised by a council of ministers appointed by royal decree. The representative assembly, the Landtag, is composed of two chambers, the House of Lords (Herrenhaus) and the Chamber of Deputies (Abgeordnetenhaus). The assent of the king and both chambers is requisite for all laws. The executive government is carried on by a Ministry of State appointed by the king and holding office at his pleasure. In 1898 the government revenue was \$528,828,643 and the expenditure, \$528,383,721.

History.—The rise of the Prussian power has been rapid and extraordinary. The kings of Prussia trace their origin to Count Thassilo of Zollern, one of the generals of Charlemagne. His successor, Count Friederich I., built the family castle of Hohenzollern, near the Danube, in the year 980. A subsequent Zollern, or Hohenzollern, Friederich III., was elevated to the rank of a prince of the Holy Roman empire, in 1273, and received the burgraviat of Nuremberg in fief; and his great-grandson, Friederich VI. was invested by the Emperor Sigismund, in 1411, with the province of Brandenburg, and obtained the rank of Elector in 1417. In 1608–1619 the duchy of Prussia was united to the electorate of Brandenburg, the territories of which had been greatly extended by the valor and wisdom of Friederich Wilhelm, “the Great Elector,” under whose fostering care arose the first standing army in central Europe. Dying in 1688, he left the province to his son, Frederick I., who assumed the crown at Königsberg, June 18, 1701. Pomerania was soon after added to Prussia. When FREDERICK THE GREAT (*q. v.*) ascended the throne in 1740, his disjointed dominions did not contain 2,500,000 inhabitants, and these had made but little progress in the arts, or in the accumulation of wealth. But before his death, in 1786, Prussia had been increased in size nearly half; while the population had increased to about 6,000,000. Prussia acquired, by the subsequent partition of Poland in 1792, and its final dismemberment in 1795, a great extension of territory, and upward of 2,000,000 inhabitants. Her disastrous contest with France in 1806 lowered Prussia for a while; but after Napoleon’s Russian campaign, the people rose en masse, and drove the French out of Germany. At the general peace of 1815, Prussia recovered all her former possessions (except a portion of her Polish dominions), and gained valuable acquisitions. After the accession, in 1862, of King William I., the executive government presided over by COUNT VON BISMARCK (*q. v.*), made laws, and even decreed budget estimates, without the concurrence of the chambers. In 1864, Prussia, conjointly with Austria, sent an army to occupy the

duchy of Schleswig-Holstein. A war with Denmark followed, which resulted in the annexation of that duchy to Prussia. In 1866, Hanover and Saxony were occupied by the Prussian troops, and a war followed with those kingdoms and with Austria, in which, after a brilliant campaign of two weeks, the latter power was obliged to sue for peace, and relinquish her claims as a German power. In addition, Saxony was left a mere nominal sovereignty under the control of Prussia, while Hanover, Hesse-Cassel, Nassau, and the former free city of Frankfort-on-the-Main became absorbed in the Prussian monarchy. In August, 1870, Napoleon III. declared war against Prussia, and the French armies marched toward the Rhine. An alliance having been entered into between Prussia and the Southern German powers of Bavaria, Würtemberg, and Baden, their combined forces crossed the Rhine into France. The part of Prussia in the Franco-German war is inextricably involved with that of the whole German nation. The conflict seemed to precipitate the solution of the question which had always been the aim of the king and Bismarck, German unity under Prussian leadership. On Jan. 18, 1871, King William was crowned at Versailles as Emperor of Germany, and on March 21, the first German Reichstag assembled at Berlin. The history of Prussia since is that of Germany.

KINGS OF PRUSSIA.
(House of Hohenzollern.)

Frederick I.	Date of accession	1701
Frederick William I.	"	1713
Frederick II. ("The Great")	"	1740
Frederick William II.	"	1786
Frederick William III.	"	1797
Frederick William IV.	"	1840
William I., 1861; Frederick III., 1888; William II., 1888.		

Prussian Blue, a cyanide of iron ($\text{Fe}_7\text{Cy}_{13}$) possessed of a deep-blue color, and much used as a pigment. It is also used in medicine.

Prussian Brown, a color obtained by adding a solution of the yellow prussiate of potash to a solution of sulphate of copper, which throws down a precipitate of deep brown. This, when washed and dried, is equal to madder, and possesses greater permanency.

Prussic Acid, a name given to hydrocyanic acid because it was first obtained from Prussian blue.

Pruszkowa, Séverine Zochowska, a Polish woman of letters; born about 1830. She received an excellent education, and acquired a style of almost classic purity. She published both historical and poetical works, among them: "Tales of Our Times" (1853); "Poetic Tales" (1855); "Elizabeth Druzbacka," a poem (1855); a "History of Hungary" (1863); "Sebastian Klouswieg," one of her finest poetical com-

positions; and a "View of the Literature of the Peoples of the Middle Ages, Particularly the Slavs and Germans" (1856).

Prutenic, a term applied to certain astronomical tables published by Rimbald in the 16th century, founded on the principles of Copernicus.

Pruth, a left-hand affluent of the Danube, rising in the S. E. of Austrian Galicia, on the N. E. side of the Carpathian Mountains, and flowing E. past Kolomea and Czernowitz; from the point at which it leaves Austrian territory to its embouchure in the Danube at Reni, 13 miles below Galatz, it forms the boundary between Russian Bessarabia and Rumania. Length about 520 miles, navigable from near Jassy, 168 miles.

Prutz, Hans (pröts), a German historian; born in Jena, May 20, 1843. He became Professor of History in the University of Königsberg in 1870. He wrote: "Henry the Lion" (1865); "Kaiser Frederick I." (1871-1874); "Phœnicia: Geographical Sketches and Historical Studies" (1876); "The Possessions of the German Order in the Holy Land" (1877); "Secret Teaching and Secret Laws of the Templars" (1879); "Culture-History of the Crusades" (1883); "Development and Fall of the Order of Knights Templar" (1888).

Prutz, Robert Eduard, a German poet and historian; born in Stettin, May 30, 1816. His principal works are: "The Rhine" (1840); "Poems," a collection of his lyrics, in great part erotic (1841); a comedy, "The Political Lying-in Chamber" (1843); several historical dramas, as "Charles of Bourbon," "Maurice of Saxe," "Eric, the Peasants' King"; "Lectures on the History of the German Theater" (1847); "Contemporary German Literature" (1847); "Men and Books: Biographical Contributions to the History of German Literature in the 18th Century" (1862). He died in Stettin, June 21, 1872.

Prynne, William, an English pamphleteer and politician; born in Swanswick, Somersetshire, England, in 1600. He was educated at Oxford, where he took his degree in 1620. He then removed to Lincoln's Inn, where he became a barrister, and in 1627 began with Puritan severity to attack prevailing fashions. For a volume denouncing the stage, entitled "Histrio-Mastix," which was supposed to be leveled at the queen, he was condemned by the star chamber to pay a fine of \$25,000, to stand in the pillory and have both ears cut off, and to remain a prisoner for life. While in prison he wrote another book, "News from Ipswich against Laud," and being condemned again to another fine of \$25,000, and to lose the remainder of his ears, had the stumps cut off, and was branded on both cheeks. The Long Parliament in 1640 granted his

release. Soon after he entered Parliament and took a prominent part in the trial of Laud. After the fall of Charles I. Prynne opposed Cromwell, who had him again imprisoned. At the Restoration he was appointed keeper of the records at the Tower. He was a most voluminous writer. He had much learning and indefatigable industry. He died in 1669.

Prytaneum, the town hall of a Greek city, where the fire was kept perpetually burning, where ambassadors were received, where citizens who had deserved especially well of the state were sometimes allowed to live at the public expense; it was in fact the headquarters of the executive of the state. In Athens, this body, the prytaneis, 50 in number, were chosen from the 500 members of the great council, five for each of the 10 tribes. The five representatives of each tribe held office in rotation, one month at a time.

Przemysl, a town of Austrian Galicia, on an affluent of the Vistula, 61 miles W. of Lemberg by rail. It is the seat of a Roman Catholic and a United Greek bishop, carries on a considerable trade, and has manufactures of machinery, spirits, wooden wares, etc. Since 1874 it has been strongly fortified. Pop. (1891) 35,619.

Przedziecki, Alexander (pzhes-jěts'-kē), a Polish historian; born in Podolia, in 1814. He studied in Berlin; and possessing a large fortune, traveled in all parts of Europe for material relating to the history of his country. He wrote French as easily as his mother tongue. Among his works are: "Halzka d'Ostrog," a historical drama (1841); "The Capitalist," a comedy (1841); "Hedwig," a historical drama (1844); "Sources for the History of Poland" (1843-1844); "Monuments of the Art of the Middle Ages at the Time of the Renaissance of Poland" (1853-1862); "Dom Sebastian of Portugal," a comedy. He died in Cracow, in 1871.

Psalms, Book of, a book of the Old Testament. It was the praise book or psalter of the Hebrew temple or synagogues. In the present Hebrew Bibles it is placed just after the Prophets at the head of the HAGIOGRAPHIA (*q. v.*), and in Luke xxiv: 44, is generally supposed to stand for that division of the Old Testament books. The 150 psalms are arranged in Hebrew in five books, each terminating with a doxology, in some cases closing with "Amen and amen." The revised version prints them separately. Book 1 contains i.-xli.; book 2, lxii.-lxxii.; book 3, lxxiii.-lxxxix.; book 4, xc.-cvi., and book 5, cvii.-cl. All but 34 psalms have titles in the Hebrew Bible; the latter were called by the rabbis orphan psalms. In the Septuagint all but two have titles. Though not as a rule accepted as part of Scripture, they are ancient, and

worthy of high respect. They attribute all book 1 to David, except Ps. i., ii., x., and xxxiii. The name of the Supreme Being used in this book is chiefly Jehovah. Book 2 assigns Psalms to David, to Korah, to Asaph, and to Solomon, and leaves others anonymous. The name for the Supreme Being in this book is ELOHIM (*q. v.*). Book 3 ascribes Psalms to David, to Korah, to Asaph, to Ethan, and to Heman the Ezrahite. Elohim and Jehovah are about equally common in the book, the former, however, being apparently preferred. Book 4 ascribes Psalm xc. to Moses, the others not anonymous to David. Book 5 leaves many psalms anonymous, attributing others to David. The Hebrew Bible, but not the Septuagint, assigns Ps. cxxvii. to Solomon. This volume contains the Songs of Degrees. The book was evidently brought together from many sources. It was commenced, rather than entirely composed, by David. Its composition and compilation extended over centuries. Ps. cxxxvii. speaks of the Babylonish captivity as an event recently gone by. Ps. xlv. and lxxix. seem very suitable to the time of the persecution under Antiochus Epiphanes (B. C. 168-165). If the Talmudic statement, discovered by Gratz, that the night service alluded to in Ps. cxxxiv. did not become part of the Jewish ritual till the time of Queen Alexandra (79-70 B. C.), it and perhaps others of the Songs of Degrees may be slightly more recent than that date. The book of Psalms is quoted or alluded to as an inspired composition by Our Saviour and His apostles at least 70 times; no Old Testament book is more frequently quoted. Its canonical authority has never been seriously doubted. It has become the psalter of the Christian Church. Its rhythmical form and careful parallelism (now rendered obvious by the revised version) adapt it for the musical part of public worship.

Psalmazar, George, a noted impostor; born probably in Languedoc, France, about 1679. He pretended to be a native of Formosa, and in that character traveled through Germany and the Low Countries. At Sluys he made the acquaintance of a Scotch parson, who brought him to England and introduced him to the bishop of London. He published a fictitious "Historical and Geographical Description of Formosa" (1704), inventing an alphabet and a lingo professing to represent the Formosan tongue; "Dialogue between a Japanese and a Formosan" (1707); "An Inquiry into the Objections against George Psalmazar of Formosa, with George Psalmazar's Answer," both inquiry and answer doubtless written by the impostor; "Essays on Scriptural Subjects" (1753). He died in London, England, May 3, 1763.

Psalmody, the art and practice of singing psalms. The composition of psalm

Psalmist

tunes and the performance of psalmody appears to have been practised and encouraged in Germany, France, and the Low Countries before it was introduced into Great Britain. In France psalmody was popularized at the Reformation by Clement Marot and Claude Goudimel, the former of whom translated the Psalms of David in verse, while the latter set them to music. Psalm singing was introduced by the Reformers; but Calvin discouraged any but simple melody, while Luther practised and favored part harmony, as did also John Knox in his psalter. The first English version of the Psalms of David, which appeared soon after that of the French, was made in the reign of Henry VIII., by Thomas Sternhold, groom of the robes to that monarch, and John Hopkins, a schoolmaster, assisted by William Whittyngham, an English divine. It was afterward superseded by the version of Nahum Tate, the poet laureate, and Dr. Nicholas Brady. The first important compilation of psalm tunes for four voices was published in 1621 by Thomas Ravenscroft, and included such well-known tunes as Bangor, St. David's, Norwich, York, etc. Sternhold and Hopkins' version of the Psalms was first used in Scotland, and was afterward superseded by the version now in use, founded on that of Francis Rous, provost of Eton, a member of Cromwell's government.

Psalmist, a writer or composer of psalms; a title applied especially to the authors of the Scriptural psalms, and specifically, with the definite article prefixed, to David. Psalmists, in Church history, were singers in the early church whose duty it was to lead the people. They were set apart for the office by a ceremony performed by a priest, who gave them this charge: "See that thou believest in thy heart what thou singest with thy lips; and manifest by thy actions what thou believest in thy heart." The Roman Catholic Church still retains this order as the leaders of music.

Psalter, the Book of Psalms; also a book containing the Psalms separately printed, and with musical accompaniment adapted to each; also specifically, the version of the Psalms in the English Book of Common Prayer. In the Roman ritual, the daily office in the Breviary. Our Lady's Psalter is the Little Office.

Psaltery, a stringed instrument of music used by the ancient Jews, the form of which is not known. That which is now used is in the form of a trapezium or triangle truncated at the top, having 13 strings of wire, mounted on two bridges at the sides, and is struck with a plectrum.

Psammetichus, a king of Egypt who died about 617 B. C. He was one of the 12 kings who reigned simultaneously in Egypt for 15 years after the expulsion of the

Pseudonym

Æthiopian dynasty; but being suspected by the other kings of aiming at sole sovereignty, he was driven into banishment. With the aid of some Greek mercenaries, however, he defeated the other kings in a battle fought at Momemphis, on the E. side of Lake Mareotis, after which he became the sole King of Egypt (671 or 670 B. C.), and the founder of a new dynasty.

Psammitic, in geology, applied to derivative rocks composed of rounded grains, as ordinary sandstone.

Psara, or **Ipsara**, an island of Turkey, in the Grecian Archipelago, 7 miles N. W. of Scio, about 5½ miles in length, and as many in breadth.

Psellus, Michael Constantine, a Byzantine author; born in Constantinople, in 1020. He wore the title "prince of philosophers," conferred on him by the emperors. Among his writings are: "Paraphrase of Aristotle on Interpretation" (1503); "A Work Distributed to the Four Mathematical Sciences, Arithmetic, Music, Geometry, and Astronomy" (printed 1532); "Synopsis of the Laws," in iambic verse (1544); "Dialogue about the Action of Demons"; "Of the Virtues of [precious] Stones." He died about 1110.

Pseudepigraphy, the ascription of false names as authors to books.

Pseudisodomon, in Greek architecture, a mode of building in which the walls were filled in between the bond stones or stretchers with rubble or small stones bedded in mortar, with course of equal height.

Pseudomorph, a mineral which has replaced another, or which appears in crystal forms which are foreign to its original formation. Massive varieties of minerals are more subject to such changes, but the action is frequently more difficult to trace. There are three kinds: (1) Pseudomorphs proper, divided originally by Blum into (a) those formed by loss of a constituent, (b) by gain of a constituent, (c) by a change of constituents, (d) by total replacement, among which are included certain fossils; (2) Epimorphs, which are formed by the encrustation of another mineral; and (3) Paramorphs.

Pseudonym, a false, feigned, or fictitious name; a pen-name. Following is a list of the pen-names of some well-known writers:

Agate.....	Whitelaw Reid
A. K. H. B.....	Dr. A. K. H. Boyd
Alice King.....	Mrs. A. King Hamilton
Alice C. Thompson.....	Mrs. Meynell
Ally Sloper.....	Charles H. Ross
Amy Lathrop.....	Miss A. B. Warner
An Amateur Casual.....	James Greenwood
Anna Isabella Thackeray.....	Mrs. Ritchie
Annie Swan.....	Mrs. Burnett Smith
Annie Thomas.....	Mrs. Pender Cudlip
Anstey, F.....	F. Anstey Guthrie
Anthony Hope.....	A. W. Hawkins
Artemus Ward.....	Charles F. Browne

Pseudonym

Arthur Penn.....	J. Brander Matthews
Arthur Sketchley.....	Rev. George Rose
Arthur Stahl	Mme. Valeski Voigt
Ascott R. Hope.....	R. Hope Moncrieff
Aston Leigh.....	Mrs. Diehl
Bachelor Bluff	Oliver B. Bunce
Bettina	Elizabeth van Arnim
Betty Paoli	Elizabeth Gluck
Bill Arp	Charles H. Smith
Bill Nye	Edgar Wilson Nye
Brick Pomeroy	Mark M. Pomeroy
B. V.	James Thomson
Bystander	Goldwin Smith
Caliban.....	M. Bergerat
	Jules Claretie
Captain Crawley	G. F. Pardon
Captain A. C. Roberts.....	Hobart Pasha
Carle	Victorien Sardou
Carlton.....	Charles C. Coffin
Carmen Sylva.....	Queen of Rumania
Cham	Amédée de Noé
Charles Egbert Craddock.....	Mary N. Murfree
Christopher Crayon	J. E. Ritchie
Christopher Crowfield.....	Mrs. H. B. Stowe
Clara Bell (Cincinnati "Inquirer").....	Olive Logan, and others
Claribel (song-writer).....	Mrs. Barnard
Claude Vignon	Mme. Bouvier
Cora May	Jennie Curtis
Cousin Alice	Alice B. Haven
Currer Bell.....	Charlotte (Brontë) Nichols
Cuthbert Bede	Rev. Edward Bradley
Dagonet	G. R. Sims
Danbury Newsman.....	J. M. Bailey
Democritus Jr.....	Robert Burton
De Montauban, G.....	Wm. P. Greenough
Dick Donovan	J. E. Muddock
Dick Tinto	F. B. Goodrich
Dod Grile	Ambrose Buree
Doesticks	Mortimer Thompson
Doro D'Istrea.....	Elina Ghiki (Princess Kotsova)
Druid	H. H. Dixon
Dun Browne	Rev. Samuel Fiske
Edna Lyall.....	Ada Ellen Bayly
Edward Maitland	Herbert Ainslie
Edward Garrett	Mrs. Isabel F. Mayo
Elizabeth Wetherell	Susan Warner
E. Marlitt	Henrietta Eugenia John
Emma J. Worboise	Mrs. E. Guyton
E. Nesbit	Mrs. Bland
Ennis Graham	Mrs. Molesworth
Esme Stuart	Miss Leroy
E. V. B.	Mrs. Boyle
Fannie Forrester.....	Mrs. Emily C. Judson
Fanny Fern	Mrs. Sarah Partor
Fat Contributor	A. Miner Griswold
Father Ignatius.....	Rev. J. Leycester Lyne
Father Prout	F. S. Mahoney
Fay	Mrs. Fayette Snead
Figaro	Henry Clapp Jr.
Florence Percy	Mrs. Elizabeth Akers
Florence Ward	Mrs. G. James
Frank Fairleigh	Francis E. Smedley
Frank Forrester	Henry W. Herbert
Gabriel Setoun	M. Hepburn
Gail Hamilton	Abigail Dodge
Gath	George Alfred Townsend
Gavin Ogilvay	J. M. Barrie
Geoffrey Crayon	Washington Irving
George Eliot.....	Marian Evans
George Sand.....	Mme. Dudevant
G. M. Craik	Mrs. E. M. May
G. M. Hutton	Mrs. Mona Caird
Grace Greenwood	Sara J. Lippincott
Grace Wharton	Mrs. K. Thomson
Great Unknown	Sir Walter Scott
Grimsel	M. Rockefeller
Guy Roslyn	J. Hatton
Gyp	Comtesse de Martel
Hans Breitman	Charles G. Leland
Helen Hunt or H. H.....	Mrs. Helen H. Jackson
Helen Mathers	Mrs. (Mathers) Reeves
Henry Irving (actor).....	John Henry Brodribb
Holme Lee	Harriet Parr
Howard Glyndon	Laura C. Redding
Hugh Conway	F. J. Fargus
Hugh Haliburton	Logie Robertson

Pseudonym

Ian Maclaren Rev. John Watson
 Ida Clare Mrs. Lelia Robinson Chute
 Ik Marvel Donald G. Mitchell
 Impulsia Gushington Lady H. Dufferin
 Ingoldsby Rev. James Hilyard
 Invisible Green Wm. G. Crippen
 Iota Mrs. Mannington Caffyn
 Irenæus Prime Rev. S. I. Prime
 Isa Craig Mrs. John Knox
 Ithuriel Clarence Hopper
 Jacob Bibliophile Paul La Croix
 Jennie Deans Mrs. Jane G. Swisshelm
 Jennie June Mrs. Jennie C. Croly
 J. F. Slingsby Dr. J. F. Waller
 Joaquin Miller Cincinnatus H. Miller
 John Dangerfield Oswald Crawford
 John Oliver Hobbs Mrs. Craigie
 John Wilson Maitland William Watson
 John Oldcastle Wilfred Meynell
 John Phoenix George H. Derby
 John Leicester Warren Lord de Tabley
 John Strange Winter Mrs. H. E. V. Stannard
 Josh Billings Henry W. Shaw
 Josiah Allen's Wife Marietta Holley
 Jules Verne M. Olchewitz
 Kate Putnam Mrs. Osgood
 Katherine Tynan Mrs. M. A. Hinkson
 K. N. Pepper James M. Morris
 Knickerbocker Washington Irving
 Lanoe Falconer Miss E. Hawker
 Launcelot Wagetaffe C. Mackay
 Le Fanu J. Sheridan
 Leslie Keith K. Johnston
 Lewis Carroll C. L. Dodgson
 L. Marriotti A. Gallenga
 L. T. Meade Mrs. Toulmin Smith
 Lucas Malet Mrs. (Kingsley) Harrison
 Lud Halevy Levy
 Luke Limner Lohn Leighton (artist)
 Luke Sharp Robert Barr
 Maarten Maartens
 J. M. W. Van der Poorten-Schwartz
 Mace Sloper Charles G. Leland
 Madge (in "Truth") Mrs. Humphrey
 Malakoff Dr. Johnson
 Marianne Farmingham Mary Anne Hearn
 Marie Gaston Alphonse Daudet
 Marion Harland Mrs. Virginia Terhume
 Mark Twain Samuel L. Clemens
 Max Adeler Charles Heber Clark
 Max O'Rell Paul Blouet
 Maxwell Gray Miss M. G. Tuttiett
 M. E. Francis Mrs. Frank Blundell
 Michael Field Miss Bradley
 Miles O'Reilly Charles G. Halpine
 Minnie Myrtle Mrs. Sarah M. Piatt
 Miss M. E. Braddon Mrs. John Maxwell
 Miss Mulock Mrs. G. L. Craik
 Miss Grundy Miss M. A. Snead
 Misses Wetherell Susan and Anna Warner
 Mona Maclean Miss Todd
 Mother Goose Elizabeth Foster
 M. P. Toby H. W. Lucy (in "Punch")
 M. T. Jugg Joseph Howard, Jr.
 Mrs. Alexander Mrs. A. F. Hector
 Mrs. Andrew Dean Mrs. Sidgwick
 Mrs. Argles Mrs. Hungerford
 Mrs. Fairfax Mizule Bell
 Mrs. Partington Benj. P. Shillaber
 Nancy Bell M. D'Anvers
 Nimrod C. J. Apperley
 Nym Crinkle Andrew C. Wheeler
 Octave Thanet Alice French
 O. K.
 Olga Kireef, now Mme. de Novikoff
 Oliver Optic William T. Adams
 Olive Logan Mrs. Olive Logan Sikes
 Orpheus C. Kerr Robert H. Newell
 Ouida Louise de La Rame
 Pansy Mrs. S. M. Alden
 Parson Lot Rev. Charles Kingsley
 Patricius Walker William Allingham
 Patty Lee Alice Cary
 Paul Creyton J. T. Trowbridge
 Pendragon Henry Sampson
 Père Hyacinthe Charles J. M. Lovson
 Peter Parley S. T. Goodrich
 Petroleum V. Nasby David Locke

Pseudopodia

Phillis Browne	Miss Hamer
Phiz	Hablot K. Browne (artist)
Pierre Loti	Julien Viaud
Poor Richard.....	Benjamin Franklin
Porte Crayon	D. P. Strother
Q.	T. Purnell, Douglas Jerrold, A. T. Quiller-Crouch, and others.
Quilibet	George E. Pond
Ralph Iron	Olive Schreiner (Mrs. Cromwright)
Red Spinner	William Senior
Reuben Percy	Thomas Byerley
Rita	Mrs. E. M. J. Von Booth
Rolf Boldrewood	Karl E. Bayer
Rutledge	Mrs. Miriam Coles Harris
Sadie	Miss Sarah Williams
Saintine X. B. de.....	J. X. Boniface
Salmagundi	Washington Irving
Sam Slick	T. C. Hailburton
Sarah Tytler	Miss Henrietta Keddie
Saxe Holm.....	Helen Hunt Jackson
Shirley Dare.....	Susan Dunning
Sidney Dare.....	Mrs. M. J. Cochran
Shirley	John Skelton
Sholto Percy	J. C. Robertson
Sparrowgrass	Fred L. Cozzens
Straws	J. M. Field
Straws Jr.....	Kate Field
Sylvanus Urban.....	Editor "Gentleman's Magazine"
Sidney Earle.....	Sallie J. Hancock Battey
Sidney Luska.	Henry Harlan
Stephen Yorke	Miss Linskill
Sut Lovingood	George W. Harris
Sydney Yendys	Sydney Dobell
Timothy Titcomb	J. G. Holland
The Country Parson	Dr. A. H. K. Boyd
The Duchess	Mrs. Margaret Argles
The Poet Banker	Charles Sprague
Tom Cobbleigh	Walter Raymond
Trois Etoiles (***) L'Abbi.....	J. H. Michon
Trusta H.	Mrs. Elizabeth Phelps
Uncle Remus	Joel Chandler Harris
Vacuum Viator	Thomas Hughes
Vandyke Brown.....	William P. Brannin
Varley	Mrs. G. L. Banks
Verax	H. Dunckley
Vernon Lee	Violet Paget
W.	Mme. (Guizot) De Witt
Wizard	J. Corlett
Zadkiel	Lieut. R. J. Morrison

Pseudopodia, organs of locomotion and prehension in the lower Protozoa. They consist simply of prolongations of the protoplasm of the cell body, which can usually be emitted from the greater part of the general surface, and are capable of being again retracted, and blending completely with the body substance.

Pseudoscope, in optics, an instrument, invented by Wheatstone, for producing an apparent reversion of the relief of an object to which it is directed, by the transposition of the distances of the points which compose it. A false impression is thus conveyed to the eye, a globe becoming apparently concave and a hollow body assuming a convex form.

Psittacidæ, the parrot tribe, a family of scansorial birds, comprising over 300 species, of which the genus *Psittacus* is the type. See PARROT.

Pskov, a town of European Russia, 9 miles S. E. of Lake Pskov, 188 miles N. E. of Riga and 160 S. S. W. of St. Petersburg. Like Novgorod it was celebrated for its republican institutions after the 12th century. During the 14th and 15th centuries it was one of the Hanse towns, and had

Psyche

then a population three times as large as at present. In 1510 it was annexed to Moscow. During the wars with Lithuania Pskov was a stronghold of great importance. It contains a cathedral and numerous venerable churches and monasteries. Fish, obtained from the lake, and flax are the principal articles of commerce. Pop. (1900) 30,478.

Psoas, in anatomy, two muscles; the *psoas magnus* and *psoas parvus*, connected with the lumbar vertebræ. In entomology, a genus of beetles allied to *Bostrichus*.

Psoralea, in botany, the typical genus of *Psoraleæ*. *P. coryfolia* is considered by Indian doctors to be stomachic and deobstruent. An extract from it, prepared with oil or ointment, is used externally in leprosy. Camels are fond of *P. plicata*.

Psoriasis, a cutaneous disease—the scaly tetter. The *rete mucosum* and the contiguous surface of the cutis are inflamed; and there is a secretion of an unhealthy epidermis forming itself into scales, which exfoliate, and are again and again renewed. It is often hereditary, and is akin to lepra.

Psyche. In the later Greek writings the word *psyche* occurs as a personification of the human soul, and it is manifestly of this personification that Apuleius relates the following allegory: By her surpassing beauty Psyche, the daughter of a king, excited the anger and jealousy of Venus, who sent Amor (Love) to inspire her with a passion for the most contemptible of mortals. But Psyche so charmed Amor that he fell in love with her himself, and taking her to some secret cave, visited her nightly, leaving her always before the dawn. Psyche had been warned by Amor against all attempts to find out who he was; but her jealous sisters told her that her lover was a hideous monster, and Psyche determined to learn the truth. Taking a lamp she gazed at her lover while he slept, and saw before her the most beautiful of the gods. Amor, waked up by a drop of oil which fell from the lamp, rebuked her for her mistrust, and vanished. Then began the sorrows and wanderings of Psyche, who sought Amor in every temple till she came to that of Venus, who put her



PSYCHE AND EROS.

to a series of toilsome and degrading tasks, under which she must have died but for the love of Amor, who, though invisible, still consoled and cheered her. By his help she at last pacified the wrath of Venus, and, becoming immortal, was united with her lover forever.

Psychical Research of the Century.

It is difficult even to give a name to the subject of this essay. The word "psychical" seems to beg the question and to insinuate that there is such a thing as a psyche, or soul, distinguished from the ordinary intellect. As a matter of fact, psychical research is only an inquiry as to whether there be any faculties and phenomena, to which, for lack of a better name, the term "psychical" may be applied. That there are such faculties and such phenomena has been the belief of the majority of mankind in all known ages. A singular uniformity marks the beliefs (or superstitions) of all periods, races, and conditions of culture. This uniformity, of course, does not, as Dr. Johnson inferred, amount to proof. Curiosity and love of excitement, wearied with the "natural" (that is, accustomed) round of events, had only to imagine exceptions to everything normal and "miracles" of uniform character were at once asserted. A dead man does not walk about; deny this—and ghosts walk. People cannot be in two places at once; deny this—and you have "bilocation." Men do not fly; deny this—and you have "levitation." The future and the remote are dark to all; deny this—and you invent every branch of prophecy, seership, and clairvoyance. Inanimate objects are never spontaneously volatile; affirm the opposite—and you are confronted with the "physical phenomena" of "spiritualism." Fire always burns objects subjected to its action; affirm the opposite—and you come to Shadrach, Meshach, and Abednego. Thus the uniformity of the beliefs in such marvels is very readily explained. But the explanation becomes more difficult when you have to deal, not with savage mythology and civilized folklore, but with the attested experiences of educated modern men and women. They have witnessed one or other of these marvels, or so they persist in averring. Their experience has been identical with that of savages and barbarians; with that of classical antiquity; with that of saints, witches, and members of the Royal Society at the time of the Restoration. This fact is so puzzling that, at different periods, educated persons have investigated the evidence for the reported marvels. In the Alexandria of the 4th Christian century, Porphyry; in the England of Charles II., Glanvil, More, Baxter, and Boyle; in the America of 1680–1720, the Mathers; in the Germany of 1760–1830, Kant and Hegel; in the

France of 1780–1830, various learned bodies, took part in these investigations. Little that can be relied on was discovered. The researches were usually unmethodical, often prejudiced, often superstitious. Only in the last 20 years has inquiry been methodical, skeptical, and persistent. The practices of Mesmer at the end of the 18th century opened the way. They interested, in the 19th century, the Schellings, Hegel, and Ritter. Hegel believed in clairvoyance, in what is called telepathy (the action of distant mind on distant mind, through no known channel of sense), and in the divining rod. For all these things he found a place in his "Philosophy of Spirit." The theory which explains what we call facts of hypnotism by "animal magnetism" was accepted, or at least many of the marvels of this kind were accepted, in a report of a scientific French committee in 1831. But the report was burked, and the topic was banished to keep company with the origin of language and the squaring of the circle. Yet the topic kept recurring, and the "magnetic sleep" was vouched for by Dr. Elliotson. About 1841–1845, Braid of Manchester introduced the word "hypnotism," to cover the phenomena of induced somnambulism. He proved that the old theory of magnetic efflux from the operator was superfluous, and that the sleep, with all its peculiarities of hallucination and of submission to the will, could be induced in a variety of mechanical ways. The patient could be made insensible to pain, and only the introduction of chloroform checked the use of hypnotism in surgical operations. It was also shown that the mind of the hypnotic patient could be so influenced to affect his body, and, at least in nervous and hysterical diseases, to exercise a healing influence. These discoveries, obviously, explain many of the stories of witchcraft, of healing miracles, and of "glamor," or the induced false perceptions, which were part of the stock in trade of conjurers in the Middle Ages and the 17th century.

So far, I think, these inquiries have undeniably reached solid ground, and have cleared up the obscure subject of witchcraft. The only question is one of degree. How far are the stranger phenomena of hypnotism, such as the suggestion of sleep from a distance, based on good evidence? In the middle of the century, Drs. Gregory and Mayo, in two interesting works, investigated the amount of truth involved in popular superstitions. They accepted clairvoyance and successful crystal-gazing, that world-wide practice. Meanwhile, many physicians and others worked at the topic of hallucinations of the senses, both in the sane and the insane. A few of them brought forward cases of premonitory dreams and telepathic incidents which they professed

to be unable to explain away. The subjects of a certain Major Buckley (1840-1850) were deemed to be peculiarly clairvoyant, and the anecdotes, in one or two cases, have good evidence. The case of "Queen Mary's Jewels" (criticized in my "Book of Dreams and Ghosts") has, at all events, romantic historical interest. In 1848 a very old set of beliefs was moved into new life. The noises and disturbances in the Fox family at Hydesville, N. Y., were only a link in a historic chain of similar alleged occurrences. They are of rather more than dubious authenticity, but they were the beginning of modern "Spiritualism," with numberless impostures. The chief thaumaturge and prophet of the movement was Daniel Dunglas Home (his palmy years were 1855-1865), who had a singular career of social and magical successes in the courts and literary society of Europe. Few feats of savage, or Neoplatonic, or saintly wonder workers were absent from his repertoire, and living men of the highest eminence in physical science are still wholly unable to explain what they saw of his performances. I have known but one case in which, on first-hand evidence, imposture was attributed to him; and a jury practically found him guilty of cajoling a silly old woman out of her money. That is the blot on Home's scutcheon; for the rest, the great mass of unpublished letters to him from many distinguished correspondents attest his inexplicable success. He was not a clever man, and, had he not been a "medium," would have been a reciter and musician of the drawing room. Other "mediums" on the same lines have been numerous; few, if any, professionals have escaped exposure. Meanwhile the theory of the feats, that they are caused by "spirits," is now almost confined to the half-educated.

Much, at this time, was written about "table turning." This is a form of automatism familiar to most savage races. A person, or persons, touches a table, a stick, a pencil, or what not; the thing moves, under no conscious muscular action of theirs, and gives responses to questions by its movements, in a variety of ways. These responses are sometimes correct though unknown to the operators. Dr. Carpenter explained these things by a theory of "unconscious cerebration." Everyone will admit that many things are registered in the mind of which the ordinary consciousness is not aware. Many things once present to consciousness are forgotten. Again, a person speaks to you when your mind is engaged. You know nothing, consciously, of what has been said, yet it is registered in the brain. The theory, then, is that the "unconscious," or "subliminal," or "subconscious" self expresses its knowledge through unconsciously exerted muscular

movements. But the phenomena were often ascribed to the action of "spirits." The philosophy of the unconscious, or subconscious, studied by Kant and brought to England by Sir William Hamilton, had not attracted attention in England. Psychical research investigating automatic actions has enlarged our knowledge of this obscure topic.

Another theme is that of diabolical or spiritual "possession," the patient assuming a new character, speaking in a new voice, and discoursing about facts of which, normally, he is ignorant. Returning to his normal self, he is unaware of what he did in his secondary self. The new name for what was called "possession" is "alternating personality," a condition which seems akin to the difference between the sleepwalking or hypnotized and the normal, waking self. How such secondary selves acquire their apparently supernormal knowledge, whether by revival of knowledge unconsciously present even in the normal state, or otherwise, is an unsettled question.

After the "spiritualistic" wave expended itself, at least among the educated, a society was formed in England, "The Society for Psychical Research," to investigate the whole mass of reported supernormal phenomena. The founders, about 1880, were a group of Cambridge scholars, the late Mr. Edmund Gurney, Mr. Frederick and Mr. Arthur Myers, the late Professor Sidgwick, Mr. Podmore, and others. Many men of science, such as Sir William Crookes, Prof. Balfour Stewart, Prof. Oliver Lodge, the late distinguished electrician, Professor Hertz, with Lord Tennyson, Mr. A. J. Balfour, M. P., Mr. Gladstone, and a number of British and Continental savants, lent their names and a portion of their energy to the society. In the American branch, Prof. William James, with others, represents official psychology. The object of the society was to collect and cross-examine first-hand evidence for the ancient alleged phenomena called "ghosts," "wraiths," "haunted houses," clairvoyance, premonitions, "spiritualistic disturbances," and so forth. The society thought that ideas of such old standing and wide diffusion, and reported modern experiences in the same kind, ought to be scientifically examined. Experiments were also to be made. The leaders were men familiar with the science of psychology and of the brain. Mr. Myers and Mr. Gurney especially conducted a long and careful series of experiments in hypnotism. Mr. Gurney published a very learned essay on "Hallucinations of the Senses." Meanwhile, Mr. Gurney especially, with Mr. Myers, Mr. Podmore, and Mr. and Mrs. Sidgwick, collected all available first-hand evidence for "ghosts" of the dead and "wraiths" of the living or dying.

The personal examination of witnesses and of corroborative evidence was pursued with minute and conscientious care.

Moreover, many experiments were made in "thought-transference." One person, say, thinks of a diagram, a picture, a card, or what not, which another person, carefully excluded from sensible contact with the first, endeavors to reproduce. The results often seemed highly successful, and experience enabled the experimenters to discover and eliminate such causes as "unconscious whispering," as well as to detect some methods of fraud. Having convinced themselves that the transference of thought, not by any recognized channels of the senses, was a possibility, even when the experimenters were not in the same room, the investigators applied their discovery to their great collection of ghosts and wraiths. The results were published in two large volumes, called "Phantasms of the Living." The argument, put briefly, was that the mind or brain of a person in a crisis, notably in the crisis of death, could affect by visual, audible, or other hallucinations of various kinds and degrees, the mind or brain of another person at a distance. This was a mere development of the idea of voluntary and experimental thought-transference by no recognized channel of sense. These conclusions, if accepted, account for the universal belief in death-wraiths. But, of course, an obvious difficulty arises. Many sane and temperate people have had experience of the hallucination that a distant person is present, when that person turns out to have been in perfect health and in no crisis at all. Therefore we must ask, do the hallucinations which coincide with a death or other crisis coincide by mere accident, and so afford no evidence for the action of mind on distant mind? Without an enormous census, this question cannot be decided. The society, however, collected more than 17,000 answers to a list of questions, and the committee satisfied themselves that, on this body of testimony, the hallucinatory appearances coincided with the death of the person who seemed to appear, 440 times more often than ought to be the case by the law of probabilities. They pronounced that "between deaths and apparitions of the dying a connection exists which is not due to chance alone." This position has been attacked by Dr. Parish in his "Hallucinations and Illusions."

The society, as a society, expresses no opinion, but the committee of the society, for their part, decided that wraiths are coincidental, or veridical hallucinations, produced by some unknown mental or cerebral process, called, provisionally, "telepathy"—sensation from a distance. Whether the process is physical, and caused by the molecular action of one brain upon another distant and recipient brain (as in "wireless

telegraphy"), or whether the process is psychical, and involves the action of a mysterious psychical faculty, there is no means of deciding. But if we admit that there are phantasms of the dead, not being mere casual hallucinations, then we must conceive the process to be psychical; the brain of the dead being dust, the "soul" must be the agent. Of phantasms of the dead, or "ghosts," the society has collected numerous examples at first hand. On the hypothesis already explained, these appearances would be caused by the action of the disincarnate upon the living mind. But how can it be proved that the phantasm is no mere empty hallucination or illusion, begotten subjectively by grief, by association of ideas, or by a casual arrangement of light and shade? We have, in the case of the dead, no coincidental crisis of their own to which to appeal, as in the case of phantasms of the living. The only possible test is the communication by the phantasm of knowledge otherwise unattainable by the percipient.

The modern ghost seldom speaks, and the knowledge is indirectly communicated. One or two examples are needed. Thus, residing in a house in Switzerland, a lady saw a phantasm exactly like the portraits of Voltaire. She then learned, for the first time, that she occupied what had been Voltaire's room. But had she not known about Voltaire's connection with the house, and forgotten? Again, a young American, when making up his books in a hotel, sees the phantasm of his dead sister, with a long scratch on her cheek. His mother tells him, what she had kept a secret, that she herself accidentally scratched the cheek of the corpse as she arranged flowers in the coffin and that she concealed it by aid of powder. But granting telepathy, was not the phantasm a projection from the mind of the mother, who knew the fact? It is plain that telepathy, if accepted, makes it almost impossible for a ghost to prove his identity. He can do this only by communicating knowledge contained in no incarnate mind, but afterward discovered to exist in some long-lost document or other source of evidence. The nearest approach known to me to such a thing is in the case of Queen Mary's secret jewels. Gregory published a "vision" of these jewels, with many attendant circumstances, beheld by a hypnotized young man. Several years later was discovered, in a heap of old law papers in the Scottish Register House, an inventory of Queen Mary's jewels. Still later the inventory was published by Dr. Joseph Robertson. I compared the inventory with the account of the vision, and the results were, to a considerable degree, corroborative. But corroboration of this kind must, in the nature of the case, be very rare.

Thus any knowledge contributed by a seeming phantasm of the dead may be explained away by a sweeping theory of telepathy. The phantasm makes you aware of this or that fact, which is verified. But if the verifying evidence may conceivably have become known, say to a German savant working in the Sultan's library, then it may be urged that the German savant unconsciously "wired on" his information to you in the shape of a hallucination. This theory is not easily accepted, but it may be more credible than the hypothesis of a hallucination caused by a disincarnate mind.

As to "haunted houses," the society has occupied many to little purpose. Ghosts, indeed, are seen, and astonishing noises are heard by such members of the investigating parties as are in the way of experiencing hallucinations wherever they go. But that proves nothing. I myself stayed for a week in a "haunted house," whence the noises had evicted a large shooting party, but nothing beyond the normal swam into my ken. To be sure, I had asked for as quiet a room as possible—I certainly got it. As far as the researches of the society go, the ghosts retreat before them, whereas, on the theory that the society are superstitious fools, they ought to see ghosts in exceeding abundance by dint of expectation. It would appear that haunted houses are local centers of a permanent possibility of hallucination. Thus in an old house at St. Andrew's, a cheerful family last year constantly met an unknown lady on the stairs. She always went into the same room, but never was found there when pursued. The cheerful family regarded her as a pleasing peculiarity of the mansion. This anecdote leads to the difficult topic of "collective hallucination," as when a number of persons similarly situated are similarly and simultaneously hallucinated. The causes remain a puzzle. Are all affected by an external cause, or does one person "wire on" his hallucinations to the others? It will be observed that this theory of hallucination gets rid of the old puzzle, "How about the clothes of the ghost?" Clothes have no ghosts, yet I have heard of only one ghost without clothes (on the evidence of the report of a criminal trial in 1753). The new theory simply explains that there is neither ghost nor clothes in the case; the hallucination merely includes clothes for the sake of decency, or because the agent, the mind which affects the percipient's mind, thinks of himself as dressed "in his habit as he lived."

While the society, advancing from the experimental thought-transference to telepathy, has more or less explained "wraiths," and has, perhaps, suggested a conceivable theory of ghosts, in the region of spiritualistic material phenomena, as of

volatile articles of furniture, it has found no certainty. Experiments with paid "mediums" have invariably resulted in the detection of imposture, notably in the case of Slade and of Eusapia Paladino. But it is fair to say that some thinkers even now believe that Eusapia occasionally gets her effects without cheating. In the cases of amateur mediums, many things told on evidence unimpeachable in worldly matters are certainly hard to explain. For a number of years a Mrs. Piper, a citizen of the United States, has been closely studied by the learned, as by Prof. William James, Dr. Hodgson, and Prof. Oliver Lodge. Her specialty is to convey, by writing or word of mouth, "messages from the dead." Vast reports on Mrs. Piper have been edited by Dr. Hodgson, certainly a clear-minded and skeptical observer, who exposed Eusapia Paladino and Madame Blavatsky. As at present advised, Dr. Hodgson expresses his belief that the dead do communicate through Mrs. Piper. Others hold that the "communicators" are only "secondary personalities" of the lady, and that, when she does hit on facts not normally knowable by her, she owes the information to telepathy. How is the reverse to be proved? How can she communicate matter at once capable of verification, and yet unknown to any living mind? This is the old difficulty which besets spirits of the dead.

On the whole, psychical research has, I think, shown that there is a real element of obscure mental faculty involved in the "superstitions" of the past and present. It has also made some discoveries of practical value in hypnotism and the treatment of hysteria. It strengthens the opinion that science has not yet exhausted all attainable knowledge about the constitution of man. The study has usually been criticized by persons as supercilious as superficial, who have not taken the trouble to get up their case, and who declaim against "the supernatural." There cannot be anything supernatural; there may be many things supernormal. To the popular mind, to "the man in the street," psychical research is interesting only so far as the man in the street thinks that it affords matter confirming, or confuting, the belief in the continued conscious existence of the human personality after death; or as supplying "tips" for the turf or the Bourse. Science is not concerned with these practical results, but only with the investigation of phenomena.

ANDREW LANG.

Psychology, the science of mental phenomena. Opinion is far from unanimous on many of the most important points of psychological doctrine, especially on such points as involve a philosophical view of the nature of mind. The chief different ways of conceiving and defining the mental facts with which psychology has to do may

be traced to the influence of rival philosophical hypotheses as to the nature of mind.

Thus, in the first place, we have the view that psychology deals with the facts of the conscious mind which, when knowing, feeling, or striving, is always conscious of itself as knowing, feeling, or striving—*i. e.*, is self-conscious. This is the view, for instance, of Sir W. Hamilton. But it has many difficulties. We can hardly ascribe self-consciousness to the lower animals or to very young children, and yet some kind of mental life clearly belongs to them; so that it would seem that mental life and self-consciousness cannot be identified. Further, many psychologists (including Hamilton) are of opinion that there are mental phenomena unaccompanied by self-consciousness even in mature human life. And if self-consciousness is thus recognized as belonging to mental life only under certain conditions and at a comparatively developed stage, it will be one of the main purposes of psychology to examine these conditions and trace its growth.

In the second place, a materialistic view of mind is connected with the attempt to make brain physiology play the part of a psychology. It is plain, however, that a sensation or a feeling of pleasure or pain is a fact of an entirely different order from a neural disturbance. The one may accompany or even cause the other (or both may be only different aspects of the same ultimate existence), but the characteristic nature of the mental fact is not reached by the most thorough investigation of its physiological conditions, while the latter are in many cases much more obscure than the phenomena they are adduced to explain.

In the third place, an attempt has been made (sometimes apart from any philosophical hypothesis as to the nature of mind) to start with certain mental facts—called presentations, sensations, or feelings—regarded as ultimate or independent, and to trace the laws and manner of their combination and succession. This method has been worked with excellent result by the English Associationist psychologists. By a similar method, and by treating presentations as forces, Herbart and his followers have elaborated a mechanism of the mind and reduced psychology to mathematical form. The difficulty of this mode of conceiving mind is to explain how a series of sensations—on any interaction of presentations—can generate the consciousness of a self persisting through changing states; and even to give any meaning to sensation or presentation without regarding it as experienced by or presented to mind. On these grounds many psychologists, while influenced by the scientific method of the Associationists and of Herbart, hold that presentation or sensation is only conceivable

as belonging to a subject or mind. So far, mind must be assumed by the psychologist as implied in the experience of which he has to trace the development. This subject, or mind as the condition of experience, may be admitted to elude psychological observation. As Hume says: "I never can catch myself at any time without a perception, and never can observe anything but the perception"—*i. e.*, it is the empirical ego, or mind with its contents of experience, which is the object of psychological observation. But the pure ego, or subject, is nevertheless implied by every mental fact. Psychology may, in this way, be distinguished from other sciences as dealing with subjective facts, or, rather, with the subjective aspect which belongs to all facts—*i. e.*, as Dr. J. Ward puts it, with the phenomena connected with presentation to a subject.

Psychrometer, an instrument for measuring the tension of aqueous vapor in the atmosphere; a wet and dry bulb **HYGROMETER** (*q. v.*).

Ptarmigan, *Lagopus mutus*, a game bird found in the N. of Europe, especially in Norway and Sweden, and in the United States. In winter the plumage of the male is almost wholly white, with a small patch behind the eye; the shafts of the primaries and the bases of the exterior tail-feathers are black, and there is a patch of bare red skin around the eye. In the summer the black retains its position, but the white is mottled and barred with black and gray. The length of the adult male is rather more than 15 inches.

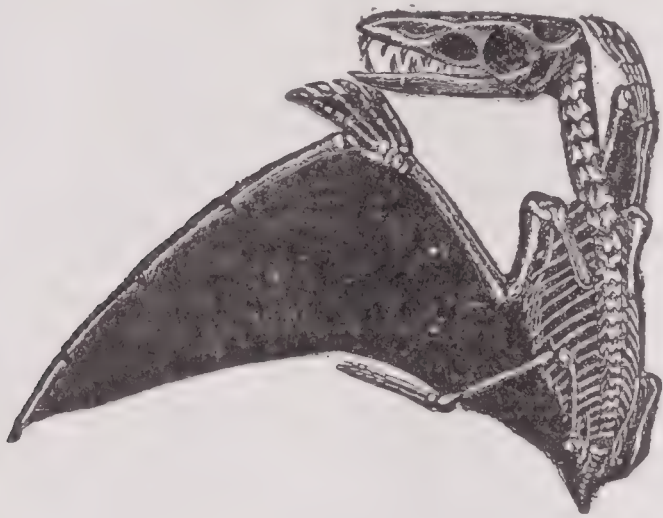
Ptoraspis, a genus of *Placodermi*, having the cephalic shield finely grooved, and composed of seven pieces. It had a rostrum in front, and its lateral angles were produced so as to form short cornua. So far as is known, it is the most ancient fish form, two species being known from the Upper Silurian, and six from the Lower Devonian of Orkney and Perthshire, Scotland.

Pteroceras, in zoölogy, scorpion shell, or spider shell. Shell, when young, like that of *Strombus*; afterward the outer lip becomes prolonged into several long claws, one of them forming a posterior canal. Recent species 12, from India or China.

Pterodactyl, a remarkable genus of fossil lizards, peculiar to the Mesozoic strata. Its anomalous structure was long a puzzle to comparative anatomists. Blumenbach considered it a palmipede, or web-footed bird; while its original describer, Collini, and other more eminent naturalists, referred it to the mammalia, finding its nearest ally in the bat. The careful investigations of Cuvier, however, showed that the pterodactyl was a true lizard, but possessed of the power of flight, which it performed,

Pteropoda

not by a membrane stretched over its ribs, like the living dragons, but more as in the bats, except that the wing was attached,



PTERODACTYL: RESTORED.

not to several, but only to a single finger — the fifth — the others being free and short. The bones of the fifth finger were very



PTERODACTYL: SKELETON.

elongated, and the last joint terminated in a long, slender, unguarded apex; the terminal joints in the other fingers were furnished with strong claws.

Pteropoda, in zoölogy, a class of Cuvier's *embranchement* or sub-kingdom Mollusca. Also, a sub-class of Cephalopoda, in which the mid-region of the foot is drawn out into a pair of wing-like muscular lobes, used as paddles. The hind region is often absorbed, but may carry an operculum; the fore region is sometimes drawn out into tentacles, provided with suckers. There are two orders: *Thecosomata* and *Gymnosomata*.

Pterosauria, an order of flying Reptilia of Mesozoic age. No exoskeleton; dorsal vertebræ procœlous, anterior trunk-ribs

Ptolemaic System

double-headed; broad sternum, with median keel, and ossified sternal ribs. Jaws generally armed with teeth, implanted in distinct sockets. The fore-limb consists of a humerus, ulna, and radius, carpus, and hand of four fingers, the inner three unguiculate, the outer clawless and enormously elongated. Supported by this finger, the side of the body, and the comparatively short hind limb, was a patagium, or flying membrane. The bones were pneumatic. Chief genera: *Pterodactylus*, *Dimorphodon*, *Rhamphorhynchus*, *Pteranodon*, and *Ornithopterus*. Professor Seeley, having regard to the ornithic type of brain, and the pneumaticity of the bones of the Pterosauria, places them in a distinct class, Ornithosauria, which he regards as most nearly related to, but coequal with, the class Aves.

Pterygotus, in palæontology, a genus of Eurypteridæ. It has been restored by Dr. Henry Woodward. Anterior portion of the body with a carapace, having a pair of large compound eyes and a pair of minute larval ones. Five pairs of appendages beneath the carapace; the first pair chelate, and constituting the antennæ, the next three pairs spinous organs, and the last pair rowing organs. Besides the head there are 13 free segments, counting the telson as one.

Pthah, or **Phtha**, an ancient Egyptian divinity, the creator of all things and source of life, and as such father and sovereign of the gods. He was worshiped chiefly at Memphis under the figure of a mummy-shaped male, and as a pygmy god.

Equivalent to the Greek Hephæstus.

Ptolemæus, the dynastic name of 13 kings of Egypt, who reigned from 323 to 43 B. C. The most famous was Ptolemæus Soter, who reigned from 323 to 285 B. C. See **PTOLEMY I.**

Ptolemaic System, the hypothesis maintained by Ptolemy in his "Almagest" that the earth was a fixed body, remaining constantly at rest in the center of the universe, with the sun and moon revolving round it as attendant satellites. To account for the more complicated movements of the planets, a contrivance was devised by which each planet revolved in a circle, while the center of that circle described another circle round the earth, for the ancient physicists refused to admit that any

movement except in a circle could be perfect. The Ptolemaic system prevailed till Copernicus propounded what is now accepted as the true system of the universe. See COPERNICAN SYSTEM: PTOLEMY, CLAUDIUS.

Ptolemy, the name of various ancient rulers, as follows:

PTOLEMY I., surnamed Soter, founder of the Græco-Egyptian dynasty of the Lagides, was a Macedonian, supposed to be a natural son of Philip II., and became a favorite general of Alexander the Great, whom he accompanied on his expedition to Asia. On the death of his master, in 323 B. C., Ptolemy I., obtained Egypt for his province. For 20 years he was almost constantly engaged in war. He defeated his rival Perdiccas, acquired Phœnicia and Cœlo-Syria; joined the league against Antigonus; was defeated by Demetrius in 306, and lost the Island of Cyprus, and soon after took the title of king. He saved Rhodes when besieged by Demetrius, and received the title of Soter (saviour); and after the fall of Antigonus he applied himself to the promotion of commerce, literature, science, and the arts in his own dominions. Philosophers, poets, and painters gathered to his court, and the foundations were laid of the famous Alexandrian Library and Museum. In 285, Ptolemy resigned his crown to his son, surnamed Philadelphus, and died in 283.

PTOLEMY II., surnamed Philadelphus (lover of his brother), born in Cos, 311 B. C., was the youngest son of the preceding by his favorite wife, Berenice. He became king on the abdication of his father in 285, and had a long, and for the most part peaceful reign. He had been carefully educated, and he entered heartily into his father's plans for promoting the prosperity of his kingdom, completing the Alexandrian Library Museum, patronizing learning and learned men, founding colonies, and increasing his army and his revenue. He made a treaty of alliance with the Romans, and encouraged the resort of Jews to Egypt. According to tradition, it was by his order that the Septuagint version of the Old Testament was made. Ptolemy was twice married; his second wife being his sister Arsinoë, widow of Lysimachus. He died in 247.

PTOLEMY III., surnamed Euergetes (benefactor); was early engaged in an important war against Syria, which having invaded he advanced without opposition to Antioch, then turned E., subduing Mesopotamia, Babylonia, etc. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor, and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the

affairs of Greece against the rulers of Macedonia, and maintained friendly relations with Rome. Like his predecessors he was the patron of scholars, and his court was the resort of the most distinguished men of his day. He died in 222, B. C.

PTOLEMY IV., surnamed Philopator, succeeded Ptolemy III. His Syrian possessions having been gradually wrested from him by Antiochus the Great, Ptolemy put himself at the head of a large army and completely defeated Antiochus at Raphia, in 217, B. C. He later gave himself up completely to debauchery, and died 205 B. C.

PTOLEMY V., surnamed Epiphanes, son of Ptolemy Philopator, and great-grandson of Philadelphus, was born 210 B. C., and at five years of age succeeded his father. The aid of the Romans was obtained against the kings of Macedonia and Syria, who threatened to dismember his dominions. The young king was declared of age at 14, and crowned at Memphis; and three years later he married Cleopatra, daughter of Antiochus of Syria. He had an able and upright minister in Aristomenes, but, notwithstanding his great service, had him put to death. Most of the foreign possessions were lost to Egypt during this reign. Ptolemy was poisoned in 181 B. C.

PTOLEMY VI., surnamed Philometer, son of the preceding, succeeded his father 181, B. C., under the regency at first of his mother, Cleopatra, and then of feeble and corrupt ministers, who involved the kingdom in a disastrous war. Egypt was invaded, and the young king taken prisoner by Antiochus Epiphanes; a younger Ptolemy was set up as king, and the two brothers tried to reign jointly, supported by the Romans; but they quarreled, and Philometer was driven away. He was restored by the Romans, and his brother (Euergetes II., or Physcon,) was made king of Cyrene. Philometer was killed in a battle near Antioch, 146 B. C.

PTOLEMY XI., surnamed Auletes (flute-player), was driven from his kingdom by his subjects, who were ground down by taxation; but he was restored by the Romans (to whom he gave great sums of money), and died in 51, B. C.

PTOLEMY XII., Dionysius, son of Ptolemy Auletes, succeeded to the throne conjointly with his sister Cleopatra, under the protection of Pompey, in 52. He became a partisan of Cæsar in the civil war, and after the battle of Pharsalia caused Pompey to be assassinated, who sought refuge in his states, in 48. Aspiring to be sole king, he then took arms against Cæsar, who had decided that Cleopatra should continue to reign with him, and was drowned in the Nile while flying from the field of battle, 47 B. C.

Ptolemy

PTOLEMY XIII., younger brother of the preceding, was 11 years of age when Cleopatra was left sole mistress of Egypt by his death. She was compelled to marry him by Cæsar, and he reigned with her till his death, in 44 or 43 B. C.

PTOLEMY XIV., Cæsarion, an illegitimate son of Cæsar and Cleopatra, and the last of the Lagides, obtained the title of king from the Roman triumvirs, 42 B. C. He was killed by order of Augustus at the age of 18, 30 B. C.

Ptolemy, Claudius, a celebrated astronomer and geographer, who flourished at Alexandria, about A. D. 140-160. He is considered the first astronomer of antiquity. He corrected Hipparchus' catalogue of the fixed stars, and formed tables by which the motions of the sun, moon and planets might be calculated and regulated. He was the first who collected the scattered and detached observations made by the ancients, and digested them into a system; this he called the "Great Construction." (See **PTOLEMAIC SYSTEM**). The "Great Construction" was translated by the Arabians into their language about 827, and from this translation, which bears the title of "Almagest," a Latin version, was made by command of the Emperor Frederick II., in 1230. This great work of Ptolemy will always be valuable on account of the observations he gives of the places of the stars and planets in former times, and according to ancient astronomers that were then extant; but principally on account of the large and curious catalogues of the stars, which, being compared with modern catalogues, enables astronomers to deduce the true quantity of their apparent slow progressive motion according to the order of the signs, or of the precession of the equinoxes.

Ptomaine, a putrescent product of animal origin and of a basic or alkaloidal nature, closely allied to the vegetable alkaloids; a cadaveric poison. About 150 varieties of ptomaines are known, some being harmless, others very poisonous. Ordinary foods frequently undergo changes that render them harmful, and especially is this so with mussels, clams, oysters, fish, meat, sausage, milk, ice-cream, cheese and canned goods. These changes are due to the presence of ptomaines. Heat will destroy the ptomaine bacteria, but their poison is not eliminated by cooking. Treatment of ptomaine poisoning is by emetics in connection with hypodermic injections of strychnine, aromatic ammonia, whisky, or very small doses of atropine, to stimulate the heart's action. In no case should opiates or coal-tar preparations be employed. See **BACTERIA**.

Public Education

Ptoxis, in pathology, a falling; as *Ptoxis palpebræ*, a paralysis of the muscle which should keep the upper eyelid from falling.

Puberty, the age at which persons are capable of begetting or bearing children; the period marked by the functional development of the generative system in both male and female, and their corresponding aptitude for procreation. In males this usually occurs in temperate climates between the ages of 13 and 16 and in females a year or two before. In very hot and very cold climates puberty is reached somewhat earlier. In law, the age of puberty is fixed in the case of males at 14 years, and in the case of females at 12. They are then held to be capable of contracting marriage. In botany, the period at which a plant first begins to bear flowers.

Pubilius Volero, the author of the Pubilian law at Rome; a law by which the power of the plebs or people was greatly increased.

Publican, in Roman antiquities, a collector of revenues, or farmer of the taxes consisting of tolls, tithes, harbor duties, duties for the use of pasture lands, mines, salt works, etc., in Roman provinces. From the nature of their office, and the oppressive exactions of many of their number, these officials were generally regarded by the inhabitants with detestation and contempt. (Matt. ix: 10.) Also, formerly a collector of toll, tribute, customs, or the like.

Public Education. The following is a statistical summary of the public school system of the United States as reported by the United States Commissioner of Education for the school year 1907-1908:

I.—GENERAL STATISTICS.

Total population	86,874,990
Persons 5 to 18 years of age.....	24,613,763
Different pupils enrolled	17,061,962
Per cent. of total population enrolled	19.64
Per cent. of persons 5 to 18 years of age enrolled	69.32
Average daily attendance	12,154,172
Ratio of same to enrollment (per cent.)	71.24
Average length of school term (days)	154.1
Total number of days attended by all pupils	1,872,736,054
Average number attended by each person 5 to 18.....	76.1
Average number attended by each pupil enrolled	109.8
<hr/>	
Male teachers	104,495
Female teachers	390,968
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Whole number of teachers.....	495,463
Per cent. of male teachers.....	21.1
Average monthly wages of teachers: c	
Males	\$62.35
Females	\$51.61
Number of schoolhouses	262,170

Public Health Acts

Value of school property..... \$945,395,162

II. FINANCIAL STATISTICS.

Receipts:

From income of permanent funds	\$22,419,282
From State taxes	58,097,151
From local taxes.....	259,340,960
From all other sources	42,062,133

Total received \$381,919,526

Per cent. of total derived from—

Income on permanent funds....	5.87
State taxes	15.21
Local taxes....	67.91
All other sources	11.01

Expenditures:

For sites, buildings, furniture, libraries, and apparatus	\$73,640,408
For salaries of teachers and superintendents	219,780,123
For all other purposes.....	77,923,879

Total expended \$371,344,410

Expenditure per capita of population \$4.27

Expenditure per pupil (of average attendance:

For sites, buildings, etc.....	\$6.06
For salaries	18.03
For all other purposes.....	6.41

Total expenditure per pupil... \$30.55

Per cent. of expenditure devoted to:

Sites, buildings, etc.....	19.8
Salaries	59.2
All other purposes	21.0

Average expenditure per day for each pupil (cents):

For tuition	10.7
For all other purposes	19.8

a Estimated. b Estimated in part. c Several States not included in this average.

Public Health Acts, in Great Britain, certain acts of Parliament regulating sanitary matters. The sanitary administration of England (with the exception of London) is mainly regulated by the provisions of the Public Health Acts of 1875 and subsequent years. The superintending and controlling authority is the Local Government Board. The local sanitary authority is vested in town and county councils. The local authority, however constituted, is armed with very extensive powers. To aid in the exercise of these it must appoint a medical officer, an inspector of nuisances, and in urban districts a surveyor. As regards the health of a district the local authority can ensure a due supply of water, make and maintain sewers and utilize sewage, provide for the cleansing of streets, remove nuisances of every kind, including those which arise from offensive trades, prevent overcrowding in common lodging and other houses, and enforce a supply of proper privy accommodation. It can close dwellings unfit for human habitation, and if the owner neglects to put them in a proper state can do so at his expense. It can com-

Public Works

pel the cleansing of houses in which there is infectious disease, and establish temporary hospitals for sufferers from it. For these and many other purposes connected with the health of the community it can levy rates and raise loans. The act of 1875 has been supplemented by others dealing with water supply, the removal of nuisances, the pollution of rivers, the injurious effects of the vapors from alkali works, the provision of public burial grounds, compulsory vaccination, and the adulteration of food and drugs.

In the United States scientific investigation into the means for preserving health is of recent growth, though laws were enacted by the colonies for the prevention of the introduction of contagious or infectious diseases from foreign ports. State boards of health have been created in nearly all the States. In 1878 Congress passed "An Act to prevent the introduction of contagious or infectious diseases in the United States," providing that no vessel coming from a foreign port where contagious or infectious disease may exist shall enter any port of the United States, except in manner prescribed by regulations. In 1879 a National Board of Health was created by Congress; its duties were to obtain information on all matters affecting public health, and to advise the several departments of the government and the executives of the several States on all questions submitted by them. Town or city boards of health have existed for many years in all the large cities.

Publicist, a term originally applied to a writer on international law, now used to denote a writer on current politics.

Public Libraries. See LIBRARIES, PUBLIC.

Public Prosecutor, an officer appointed to originate and conduct prosecutions in the public interest.

Public Schools, in England, institutions of instruction for boys, corresponding somewhat to the private preparatory schools of the United States, though of a more advanced character. The term "public" as applied to them has none of the significance attached to it in the United States, as they require the payment of a tuition fee, and are restricted by various traditional laws. The four most important are Eton, founded by Henry IV. in 1440; Rugby, founded by Lawrence Sheriff, a London tradesman, in 1567; Harrow, founded by John Lyon in 1571; and Winchester, founded by William of Wykeham in 1387. For public schools in the United States, see COMMON SCHOOLS.

Public Works Loan Commission, a body in England authorized to lend the money of the State for useful local pur-

poses. Unless where special acts of Parliament, such as the public health and education acts, leave no option, the commissioners judge for themselves of the sufficiency of the security offered by the applicants for loans, and whether the objects for which they are asked are of adequate utility to justify loans of public money.

Publius (more correctly **Publilius Syrus**), a Latin writer, so called because a native of Syria, was carried as a slave to Rome about the middle of the 1st century, B. C. His master gave him a good education, and afterward set him free. He excelled in writing *mimi*, or farces, which were interspersed with moral sentences, and a collection of them was used by the Romans as a school book. A number of apothegms, not all of them composed by him, have been published as "Opinions of Publius Syrus." One of them, "*Judex damnatur cum nocens absolvitur*" ("the judge is condemned when the guilty is acquitted"), has become famous through being adopted as the motto, from the first, of the "Edinburgh Review."

Puccinia, in botany, the typical genus of *Puccinæi*. Protopores uniseptate, stipitate, not bound together by gelatine. The genus is parasitic and destructive to the plants on which it grows. *P. graminis*, the common mildew, causes the rust or blight in corn.

Puccinotti, Francesco, an Italian physician; born in Urbino, Italy, in 1794. He was already an accomplished classical scholar when in 1811 he repaired to Pavia for a course of mathematics, physics, and natural science, in which metaphysics, ethics, and civil history were not neglected. From these studies he passed on to that of medicine at the Roman University, and graduated with much distinction in 1816. He passed from one medical chair to another, till, compromised in the patriotic movement of 1831, he was deposed from the professorship of pathology in the University of Macerata. Excluded from academic, he redoubled his literary activity, which bore fruit in his still classic treatises on medical jurisprudence and on nervous maladies. In 1835-1837 he made a special study of the cholera epidemic at Leghorn, at the same time giving to the world his masterly translation of Aretæus. In 1838 the Tuscan Archduke appointed him Professor of Medical Jurisprudence in Pisa University, and there he published his special lecture on "Nervous Diseases," his work on the "Cachexiæ," and on the maladies induced by the rice-culture (*Risaie*), and, above all, his masterpiece, the "History of Medicine" representing the labor of 20

years. He died in Florence, Italy, Oct. 8, 1872.

Puck, in mediæval mythology, the "merry wanderer of the night," whose character and attributes are depicted in Shakespeare's "Midsummer Night's Dream." This celebrated fairy is known by a variety of names, as Robin Goodfellow and Friar Rush in England, and in Germany as Knecht Ruprecht; but it is by his designation of Puck that he is most generally known in England, Germany, and the more northern nations. He was the chief of the domestic tribe of fairies, or "brownies," as they are called in Scotland; and innumerable stories are told of his nocturnal exploits, among which drawing the wine and cleansing the kitchen while the family were asleep are the most prominent.

Pückler-Muskau, Hermann Ludwig Heinrich, Prince of, a German traveler and author; born in 1785. He served in the Tuscan and Russian armies, and after the peace of 1815 devoted himself to literature, landscape gardening, and travel. One of his works was translated into English by Mrs. Austin as "Tour in England, Ireland, and France by a German Prince." Other English translations of works by him are "Semilasso in Africa" (1837); "A German Sketch-Book" (Tutti Frutti 1839); and "Egypt under Mehemed Ali" (1845). He died in 1871.

Pud, or Pood, a Russian weight which contains 40 Russian pounds, equivalent to 36 pounds avoirdupois.

Pudding Berries, the berries of the Canadian dogwood (*Cornus canadensis*), common throughout North America.

Pudding Stone, a name given to certain siliceous conglomerates, notably that of Hertfordshire, England, in which the rounded, jaspery flint pebbles resemble the plums in a plum pudding.

Puebla, the third city of Mexico, capital of the State of the same name; on a fruitful plain, 7,120 feet above sea-level, and 68 miles S. E. of the city of Mexico. In the vicinity are Orizaba, Popocatepetl, and other lofty mountains. It was founded in 1531, and is one of the handsomest towns in the republic, with broad, straight, clean streets; many of the houses, which are generally three stories high, have quaint fronts of red and white tile-work. The city contains nearly 50 churches, theological, medical, art, and normal schools, a museum of antiquities which dates from 1728, two large libraries, a number of hospitals, etc. On the great square stands the cathedral, a Doric building with two towers, the interior of which is decorated in the most sumptuous manner with ornaments of gold and silver, paintings, statues, etc., as well as other public buildings. Puebla

has a thriving trade, and an air of cheerful activity, not common in Mexico, pervades the place. In 1889 there were 22 factories; the chief articles produced are cotton, paper, iron, glass, porcelain, leather, Puebla was besieged for two months by the French, and then taken by storm, May 17, 1863. Pop. (1910) 101,313.

Pueblo, a city and county-seat of Pueblo co., Col.; on the Arkansas river, and on the Union Pacific, the Denver and Gulf, the Missouri Pacific, the Chicago, Rock Island, and Pacific, the Atchison, Topeka, and Santa Fé, and the Denver and Rio Grande railroads; 118 miles S. E. of Denver. Here are the State Hospitals for the Insane, the State Agricultural Society's buildings, the Mineral Palace Exhibition building, several libraries, high school, waterworks, street railroad and electric light plants, National and savings banks, and several daily and weekly newspapers. The city has very noted smelting iron and steel plants and large stock-yards. The assessed property valuation exceeds \$8,500,000. Pop. (1900) 28,157; (1910) 44,395.

Pueblos (Spanish, *pueblo*, "village"), a semi-civilized family of American Indians in New Mexico and Arizona, dwelling in large single habitations, which are sometimes capacious enough to contain a whole tribe. These edifices—which are often five or six stories high, and from 130 to 433 yards long, with many rooms (53 to 124) on each floor—are commonly constructed of adobe or sun-dried brick; the ground floor is invariably without doors or windows, entrance being effected by a ladder leading to the second story; and indoors ladders take the place of staircases everywhere. A somewhat pyramidal aspect is given to the whole building by each successive story receding a few feet from the line of that below it. Each family of the tribe has a separate apartment, and there are also large rooms for general council chambers and for tribal dances. In New Mexico there are 19 such villages, with over 8,000 occupants, who are skillful agriculturists, employing irrigation ditches extensively, and rearing horses, cattle, and sheep. Spinning and weaving and the manufacture of pottery also are carried on. The Moquis of Arizona are a related tribe, numbering about 1,800, in seven villages built on the summit of isolated hills. The Pueblos are under Roman Catholic missionaries, and are making steady progress in civilization and education. though on their Christianity they have grafted many of their old pagan beliefs and customs, to which they obstinately cling. They were first visited by the Spaniards about 1530, at which period their habits and their habitations were very much the same as to-

day. It is evident, however, from the wide area over which the ruins of old pueblos and remains of ancient pottery have been found, that they were at one time very much more numerous than they are now.

Puerperal Fever, the low fever of child-bed, commencing with rigors and chills from septic infection and contamination of fluids, with local lesion of structure in most cases, and often severe peritonitis. There are three marked varieties: the simple inflammatory, the mild epidemic with nervous disturbance, and the putrid or malignant epidemic. It is highly infectious, and even contagious, sometimes associated with erysipelas, but oftener caused by retained clots, dirty habits, intemperance, carelessness, etc. It may be regarded as a putrid adynamic fever in the puerperal state, and of aggravated form.

Puerperal Mania, mania sometimes attacking women the fourth or fifth day after childbirth, or later, or before delivery. There is often an aversion to food, as well as to the husband, and to the child, etc. Recovery is general.

Puerto Cabello, a seaport of Venezuela, in the State of Carabobo, 78 miles W. of Caracas. It stands on a long, low narrow peninsula on the Caribbean Sea, and has a safe, deep, and roomy harbor, defended by a fort and batteries. It is the port of Valencia, which is 34 miles distant by rail. There is an active foreign trade, which averages \$6,250,000 annually; the chief exports are coffee, cacao, indigo, cinchona, cotton, sugar, divi-divi, and copper ore. Pop. about 11,600.

Puerto de Santa Maria, a seaport of Spain, at the mouth of the Guadalete, on the bay of Cadiz, 22 miles N. E. of Cadiz. It is one of the principal export harbors for sherry, and manufactures silk, soap, hats, leather, spirits, beer, etc. The bull-fights here in May are among the most famous in the country. Pop. 22,125.

Puerto La Mar. See COBIJA.

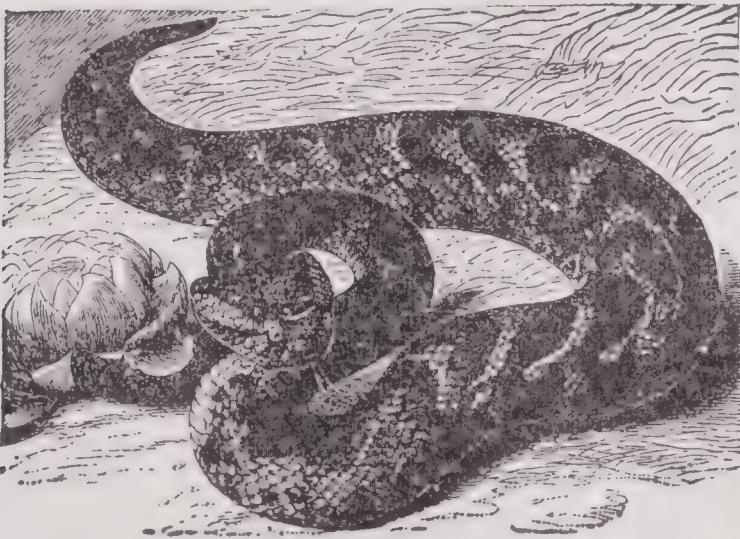
Puerto Plata, the chief port of the Dominican Republic, on the N. coast of the island of Haiti. It exports a good deal of tobacco, mahogany, sugar, coffee, cocoa, divi-divi, etc. Pop. 6,000.

Puerto Principe, former name of the province and town of Camaguey, Cuba; the province lying between the provinces of Santa Clara on the W. and Santiago de Cuba on the E.; area of province, 10,500 square miles; pop. (1907) 118,269; the city is chiefly engaged in the manufacture of cigars and in general trade; pop. (1907) 66,460.

Pufendorf, or **Puffendorf**, **Samuel, Baron von**, a German writer on the law of nature and nations; born in 1632. He

Puff Adder

studied theology and law at Leipsic and Jena, and in 1660 appeared his "Elements of General Jurisprudence." In 1661 he became Professor of the Law of Nature and of Nations at Heidelberg. In 1667 he published his work "The Commonwealth of Germany," which, from the boldness of its attacks on the constitution of the German empire, caused a profound sensation. In 1670 he went to Sweden, became Professor of Natural Law in the University of Lund, and brought out his chief work, "Natural Law and the Law of Nations," and in 1675 an abstract of it. In 1677 Pufendorf went to Stockholm as historiographer royal. There he wrote in Latin his vigorous vindication of Protestantism, "On the Spiritual Monarchy of the Pope," a "History of Sweden from the Campaign of Gustavus Adolphus in Germany to the Abdication of Queen Christina," a "History of Charles Gustavus," and in German his "Introduction to the History of the Principal States of Europe." In 1686 he received a summons to Berlin from Frederick William, Elector of Brandenburg, a history of whom Pufendorf wrote for his son, the first king of Prussia. In 1694 he was created a baron by the King of Sweden, and in the same year he died in Berlin. There are English translations of his principal works.



PUFF ADDER.

Puff Adder, the *Vipera (Clotho) arietans*, one of the most venomous serpents of South Africa. In length, when full grown, it is from four to five feet, and is as thick as a man's arm. The head is very broad, the tail suddenly tapered; prevailing color, brown, checkered with a darker shade and with white. It usually glides along partially buried in the sand, and, when disturbed, puffs out the upper part of its body, whence its popular name. The Bosjesmans smear their arrows with its venom.

Puget Sound Country

Puff Birds, *Bucconidæ*, a family resembling kingfishers in form, but living on insects like fly catchers; they also resemble the bee eaters, and are found only in South and Central America.

Puffin, the *Fratercula arctica*, a common English sea bird, with many popular names—bottlenose, coulterneb, pope, sea-parrot, and tammy norie, with others that are only locally known. By extension, the name is applied to other species of the genus. The common puffin is well known all around the British coasts, and gives its name to one of its haunts—Puffin Island, off Anglesea. It is rather larger than a pigeon; plumage glossy black above, under surface pure white; feet orange-red; bill very deep, and flattened laterally, parti-colored—red, yellow, and blue, and grooved during the breeding season, and undergoing a kind of moult at its close—a peculiarity shared by other species. Puffins lay a single egg—white, with gray markings—in a burrow sometimes excavated by themselves, but frequently in one from which a rabbit has been driven.

Pugaree, Puggerie, Puggery, Pug-gree, or Pugree, a piece of muslin wound round a hat or helmet in hot climates or warm weather, the ends being left falling down, to protect the head by keeping off the rays of the sun.

Pugatchef, Yemelyan, the son of a Don Cossack; born in 1726; was in his youth the leader of a band of robbers. During the Seven Years' War he served in the Russian, Prussian, and Austrian armies successively. Returning to Russia, he attempted to stir up an insurrection, but was arrested and imprisoned. Having made his escape he pretended to be the murdered czar, Peter III., to whom he bore a strong personal resemblance. He was joined by numbers of the peasantry, to whom he promised deliverance from their oppressions. After several considerable successes, accompanied by frightful cruelty on his part, he found himself at the head of 15,000 men, and was threatening Moscow itself when, betrayed by his followers and separated from his army, he was captured, and in June, 1775, executed at Moscow.

Puget Sound Country. The development of the Puget Sound country during the past quarter of a century has been most remarkable. Twenty-five years ago, few, if any of its towns and settlements were on the maps. It was but 56 years ago that Daniel Webster declared in Congress: "What do we want of this vast worthless area of shifting sands and whirlwinds of dust; of cactus and prairie dogs; a coast of 3,000 miles, rockbound, cheerless and un-

inviting, without a harbor on it?" The Puget Sound country alone has as many good harbors as half the Atlantic seacoast. The little town of Port Angeles, of which the East scarce ever hears, probably has the best. Seattle's is nearly or quite as good. Then there are Port Orchard, Tacoma, Everett, Port Townsend, Port Blakely, Eagle harbor, Port Madison, Port Ludlow, Port Gamble, Pleasant harbor, Seabeek, Ballard, Holmes harbor, and a dozen more. Almost any of these will receive a battleship, yet some have not even a village or a postoffice. Pleasant harbor, on Hood's Canal, would furnish safe anchorage, for 30 "Oregons" or "Iowas," and any one of them could enter at a quarter, if not low tide, yet there is not so much as a decent cabin on that beautiful and secluded body of water. There are many miles of water front that will furnish depth for the deepest draft ocean-going vessels, 250 feet from shore. There is scarcely a sunken rock or reef in the entire Sound region. The shelter is perfect, the scenery sublimely grand. Almost anywhere in the Sound region, S. of the straits, the shelter is safe for largest vessels in these harbors or out in the Sound.

The waters of this vast Sound fairly teem with fish, clams, and oysters, the latter capable of improvement. No less than 95 varieties of food fish can be secured in the Sound and its vicinity, and the vastness of the cod banks of the Pacific can as yet be only conjectured. They seem limitless. The millions of acres of flat, swamp, valley and slope of all the Sound region was 25 years ago, the most heavily timbered territory of any size in North America. It seems at present to be hardly touched. There are groves of larger trees in California, but these are of but small area. Probably no place on earth will average acre for acre the timber that the Puget Sound region can furnish. It is fir, cedar, spruce, hemlock, and alder, as well as maple and other woods. Its Douglas fir—the most common variety—has been found superior to yellow pine and other woods heretofore used for car building. It is now claimed that government tests show that it is better for shipbuilding, having greater horizontal strength than oak or Georgia pine, and superior lasting qualities. One big firm is now making heavy shipments of this fir to Germany for use in the warships of the kaiser's new navy. The standing timber of the Puget Sound region is estimated at 114,000,000,000 feet. Only 30,000,000,000 feet have been cut during the past 50 years. The growth is very rapid, 30 years producing a fair-sized tree.

The agricultural area is as yet comparatively small, but once cleared, the best of this land is easy of cultivation and the yield is beyond belief. Every acre will not

produce 50 or 70 bushels of wheat but some will, and many will yield 40, which is double the average of other States. The tide lands of La Conner have been known to yield 130 bushels of oats to the acre, and the average is double that of any other portion of the United States. Three thousand pounds of hops have grown on an acre in the Sound country, but that is extraordinary. An average of 1,500 pounds can be obtained, as compared with 700 pounds in Eastern fields. Live stock needs nothing more than a shed to shield it from the rains, and a little fodder two months of the year. The dairying business is increasing about 25 per cent. per year.

The mines of the State, strange to say, have never been developed in proportion to their worth, though mining men are now awakening to their error and are becoming aware of the riches so near at hand. It is now known that there are coal, silver, gold, and other mining riches here, and the development is something hard to keep track of. Not long ago a local authority declared that if the gold veins already uncovered in Washington are properly developed for five years they will produce \$12,000,000 per annum and keep it up indefinitely.

There are harbors everywhere. There is the richest farming region in the United States. Think of 130 bushels of oats on an acre of La Conner flats, with straw in proportion. Think of a land of fruits and flowers, enormously wooded and well watered, a land where malaria is unknown, a fine stock and dairy country and fish,—well, all the world knows of the canneries of this region. Go there and see tons of great salmon taken out at a single draft. See two or three Scandinavian fishermen farmers, their pink-sterned boat made fast beside some cannery wharf, while its owners, hats and coats off, are busy with pitchforks throwing great salmon in at the cannery door. The fishing schooners look as if they came from abroad, and though their tackles take in vast quantities of halibut, sole, smelt, mackerel, and cod, you are not so impressed with the wealth of the waters as you are when you see those pitchforks going. Up in Island county the rancher has his boat, just as an Eastern farmer has his wagon, and from 10 acres, together with the waters round about, he gets as good a living and more clear money than the Eastern farmer gets from 75 acres. He does not work as hard, he sees and enjoys more in one year, has a greater variety of food, and gets more solid comfort than an Eastern farmer does in a lifetime.

The same is true toward Port Angeles and Dungeness, and there they have even larger hopes. Port Angeles confidently expects to be the second, possibly the first city in the Sound country, and so she may be

some day, for she has the harbor, the timber at her back, the minerals, and the richest of land and waters all about her. A railway around the peninsula is being built, and prosperity has come to everybody. Such riches as lie there awaiting development the Eastern world scarcely yet knows of.

Indeed, the expansion of the Sound country and its great inland empire has as yet hardly begun. Its development must be rapid for its natural products are enormous, and the world wants them. Such a wealth of timber, minerals, marble, granite, sandstone, limestone, brick, clay, glass material, bark for tanning, and a hundred other things that cannot be found elsewhere. The Orient is 500 miles nearer than to Southern ports, Alaska is nearly 1,000 miles nearer, and the transcontinental lines are here. There is gathering here a cosmopolitan people, characterized by enterprise coupled with cool judgment. Here in the Sound region has been during the past 25 years, here and in Alaska and the Orient will be during the next 25 years, such achievement as shall render millions prosperous and thousands wealthy.

Pugilism, the practice of boxing or fighting with the fists. In the schools and by amateurs, it is practised with the gloves; in the prize ring sometimes with the naked fists. Man being instinctively a pugnacious animal, and the fist being the simplest and most natural weapon, it may be taken for granted that pugilism, as a mode of settling differences, is coeval with man himself. It formed one of the earliest of the athletic games of the Greeks; and we find the Greek poets describing their heroes and gods as excelling in the *pugne*. Boxing for men was introduced in the Olympic games in the 23d Olympiad, and for boys in the 37th Olympiad. With the exception of a girdle about the loins, the ancient pugilist fought nude. There was one feature, however, which bore no analogy to the pugilism of modern days; this consisted in the use of *cæstus*, a weapon formed of thongs or bands of raw ox-hide tied round the hands, and frequently as high as the elbows, of the boxers. Even in its simplest and most primitive forms, it was a fearful weapon enough; but when "improvements" crept in, in the shape of knobs of lead or iron, and, still later, when it assumed the form of a disk of bronze, it came to be a murderous piece of mechanism, fraught with despair and death to the less skillful fighter. As the head was exposed to great danger through the use of the *cæstus*, *amphotides*, or armor for the head, by which the temporal bones, arteries, and ears were protected, were invented; altogether, they were not unlike helmets.

Properly speaking, the ancient boxing appears to have had three distinct eras. In the first, practised during the heroic age, the head and hands were both naked; in the second, the hands were armed with bands of leather, while the head was left uncovered; in the third era, the head was clothed with the *amphotide*, while the hands battled with the most deadly form of the *cæstus*. During the first and second periods, — the *amphotides* being apparently never used in the great public games of the Greeks — the boxers stood before each other unflinchingly — he who possessed the greater skill standing on the defensive, and seeking to wear out his adversary; and the boxer who purchased victory without any wounds was held to be the better pugilist and the conqueror. Both ancient Greeks and Romans used the right arm chiefly in attacking, the left being reserved as a protection for the head and upper portions of the body. Owing to the employment of the bronze *cæstus* during the third era of ancient boxing, blows were dealt with such force as to dash out teeth, break bones, and often cause death. It was the weapon rather than the skill of the combatants that did this; anyhow, the disfigurements the ancient boxers underwent were such that frequently they were damaged beyond recognition by their friends, a fact which excited some rather grim railery at the expense of the boxers on the part of the poets Lucian and Lucilius. Like all the other athletic games of the Greeks, boxing was regulated by certain rules; the principal of these was that the pugilist was bound till wounds, fatigue, or despair compelled him to desist.

Though the natives of the British Islands are said to be inherently prone to batter each other's person with the fist, as a mode of settling their private quarrels, still it was not till the reign of George I. that pugilism came to be in a manner appropriated by the English. Henceforth we find it the usual mode of deciding all disputes with the middle and lower classes, while noblemen and gentlemen practised it as the best system of gymnastics, as the best means of attack and defense, and as the best mode of making the body pliant, flexible, and firm. In the United States as in England, the art has been brought down to the present day, through a succession of pugilistic champions.

Pugin, Augustin Northmore Welby, an English architect, the son of Augustus Pugin; born in 1811. He imbibed from his father a love of Gothic architecture, to promote the revival of which became early the object of his life. In 1834 he became a Roman Catholic, and designed a large number of ecclesiastical buildings for that

communion, among them a church at Ramsgate, which was built at his own expense. He assisted Sir Charles Barry in the designs for the new houses of Parliament, especially in those for their interior fittings and decorations. "The Contrasts, or a Parallel between the Architecture of the 15th and 19th Centuries" (1836), "The True Principles of Pointed or Christian Architecture" (1841), and "The Glossary of Ecclesiastical Ornament and Costume" (1844), are among his principal works. He died in Ramsgate, England, in 1852. His son EDWARD WELBY (1834-1875), was also a distinguished architect.

Pugin, Augustus, an English architectural draughtsman; born in France, in 1762. He settled early in life in London, where for many years he acted as assistant to Nash, the architect. The revival of Gothic architecture in England was much aided by his "Specimens of Gothic Architecture" (1821-1823), etc. Among his works were the "Picturesque Tour of the Seine" (1821) and "Specimens of the Architectural Antiquities of Normandy" (1825-1828). His representations of Gothic architecture, for beauty, accuracy, and thorough mastery of the subject, have never been excelled. He died in 1832.

Pug Mill, a mill by which clay is worked, to blend its materials and render it plastic, for bricks or pottery. It has an upright cylinder armed with intruding blades, and an upright revolving axis armed with radial blades, which work in the intervals of the former. The blades force the clay constantly downward toward the exit.

Puisieux, Madeleine d'Arsant, a French woman of letters; born in Paris, France, in 1720. She had an easy and agreeable style, but lacked warmth and imagination. Her chief works are: "Advice to a Friend" (1749-1750); "Characters" (1750-1755); "Zamor and Almanzine" (1755); "Alzarac; or, The Necessity of Being Inconstant" (1762); "The History of Mademoiselle de Terville" (1768); etc. She died in Paris, in 1798.

Puisne, in law, younger or inferior in rank. The several judges and barons of the divisions of the high court of justice, other than the chiefs, used to be called puisne judges.

Pujoulx, Jean Baptiste, a French writer; born in St. Macaire, in 1762. He composed many plays for the theater, but devoted the last years of his life to the study of natural history and other sciences. Among his works are the comedies "The Caprices of Proserpine" (1784); "The Family Supper" (1788); "Amelia; or, the Convent" (1791). He wrote also "The

New-Rich" (1798); "Paris at the End of the Eighteenth Century" (1800); and several works on mineralogy, botany, etc. He died in Paris, in 1821.

Pulaski, Count Casimir, a Polish patriot and military officer, who participated in the war of the American Revolution; born in 1747. His father, a Polish nobleman, was the organizer of the celebrated Confederation of Bar, in hostility to Russia, and for the liberation of his country, in which Casimir eagerly joined, carrying on a desultory warfare with varied success till the coalition of Russia, Austria, and Prussia completed the conquest of Poland. His father and brothers being killed, Casimir escaped with difficulty into Turkey, whence he proceeded by way of France to join the Americans, then fighting for independence, bearing recommendations from Franklin to Washington, whom he joined in 1777. Entering as a volunteer, he so distinguished himself at the battle of Brandywine as to be promoted by Congress to a cavalry command, with the rank of Brigadier-General, which command, however, he resigned five months after, in 1778. He afterward organized an independent corps of cavalry and light infantry, with which he rendered effectual service under General Lincoln, in South Carolina, in 1779, and in the siege of Savannah, Ga., where, in an assault on the latter place, he was mortally wounded. He died in 1779.

Pulaski, Fort, a fortification at the mouth of the Savannah river. Seized by the Confederates, Jan. 3, 1861, it was besieged and taken by the Union forces, April 12, 1862.

Pulci, Luigi, an Italian poet; born in Florence, Italy, Dec. 3, 1432. He was an intimate friend of Lorenzo de' Medici and of Politian; and was the author of a celebrated poem, "Morgante the Giant," a burlesque epic of which Roland is the hero. This poem is one of the most valuable sources for the early Tuscan dialect, the niceties and idioms of which have been employed by Pulci with great skill. The first edition appeared at Venice in 1481, and the book has since been frequently reprinted. Pulci wrote further a humorous novel and several humorous sonnets. He died in 1484 (or 1487). His brother BERNARDO (born about 1430) wrote an elegy on the death of Simonetta, mistress of Julian de' Medici, and the first translation of the "Eclogues" of Vergil. LUCA, another brother (born 1431), wrote a poem in honor of Lorenzo de' Medici's success in a tournament; a metrical romance of chivalry; a pastoral poem; and "Heroic Epistles."

Pulgar, Fernando de (pul'gär), a Spanish prose-writer of the latter part of the

15th century. He wrote a "Chronicle" of the reign of Ferdinand and Isabella; "Notable Men of Castile"; a commentary on the ancient "Couplets of Mingo Revulgo."

Pulitzer, Joseph, an American journalist; born in Budapest, Hungary, April 10, 1847. When quite young he came to the United States; served in the Civil War; and found a home in St. Louis, Mo. He was there employed as a reporter on the "Westliche Post," of which he afterward became editor and chief proprietor. He was well known in that city as a politician, legislator and Congressman. In 1878 he assumed the management of the St. Louis "Post-Dispatch," and in 1883 purchased the New York "World." The latter paper was then on the verge of failure, but he built it up till it became one of the most substantial daily papers in the city. Mr. Pulitzer was also noted for his liberal gifts for educational purposes.

Pulkowa, a village of Russia, 10 miles S. of the site of a magnificent observatory (lat. $59^{\circ} 46' 18''$ N. and lon. $30^{\circ} 19' 40''$ E.), the "St. Petersburg observatory," built by the Czar Nicholas in 1838-1839. In 1882 one of the largest telescopes in the world was erected here. Its determinations of fundamental star places are regarded as the most accurate of any observatory, and its investigations cover a wide field. Besides being one of the largest institutions for original research in the world, it is also a school for the training of astronomers and geodesists. It contains the largest refracting telescope in the world, except the 36-inch Lick glass, and the Yerkes telescope at the University of Chicago, Ill., its objective being 30 inches in diameter, and it was a high compliment to the attainments of the American opticians that, after investigating carefully the merits of all the great telescope makers of the world, the director, Dr. Otto Struve, decided to order the great Russian glass of the firm of Alvan Clark & Sons, of Cambridgeport, Mass., the makers (since then) of the glass for the Lick telescope. The mounting of the Russian telescope was made by the Repsolds, of Hamburg, and that of the great Lick glass by Warner & Swasey, Cleveland.

Pulley, in mechanics, one of the six simple machines or mechanical powers. It consists of a small circular plate or wheel which can turn round an axis passing through the centers of its faces, and having its ends supported by a framework which is called the block. The circular plate has a groove cut in its edge to prevent a string from slipping off when it is put round the pulley. With a single fixed pulley (that is one in which the block in which the pulley turns is fixed), there is neither gain

nor loss of power; for, as the tension in every part of the cord is the same, if a weight be suspended at one extremity, an equal weight must be applied at the other to maintain equilibrium. Hence, the effect of a fixed pulley is simply to change the direction of a force. By means of movable pulleys one can gain mechanical advantage, greater or less, according to the number and mode of combination of the pulleys. This advantage may be computed by comparing the velocity of the weight raised with that of the moving power, according to the principle of virtual velocities. Thus: In a single movable pulley with the strings parallel when there is equilibrium the weight is twice the power. It may, therefore, be considered a lever of the second class, in which the distance of the power from the fulcrum is double that of the weight from the fulcrum.

In a system of pulleys in which each pulley hangs by a separate string and all the pulleys are parallel, when there is equilibrium the weight is equal to the power multiplied by $2n$, where n is the number of pulleys. In a system of pulleys in which the same string passes round all the pulleys, and the parts of it between the pulleys are parallel, when there is equilibrium the weight is equal to the power multiplied by the number of strings at the lower block. In a system of pulleys in which each string is attached to the weight, and all the strings are parallel, when there is equilibrium the weight is equal to the power multiplied by 2 raised to a power whose exponent is one less than the number of pulleys.

Fast pulley, a pulley firmly attached to the shaft from which it receives or to which it communicates motion. **Loose pulley**, a pulley running free on the shaft, to receive the belt and allow it still to traverse without being affected by, or affecting the motion of, the shafting. **Sliding pulley**, a kind of coupling in which the band-pulley is slipped into or out of engagement with an arm freely attached to the shaft and rotating therewith.

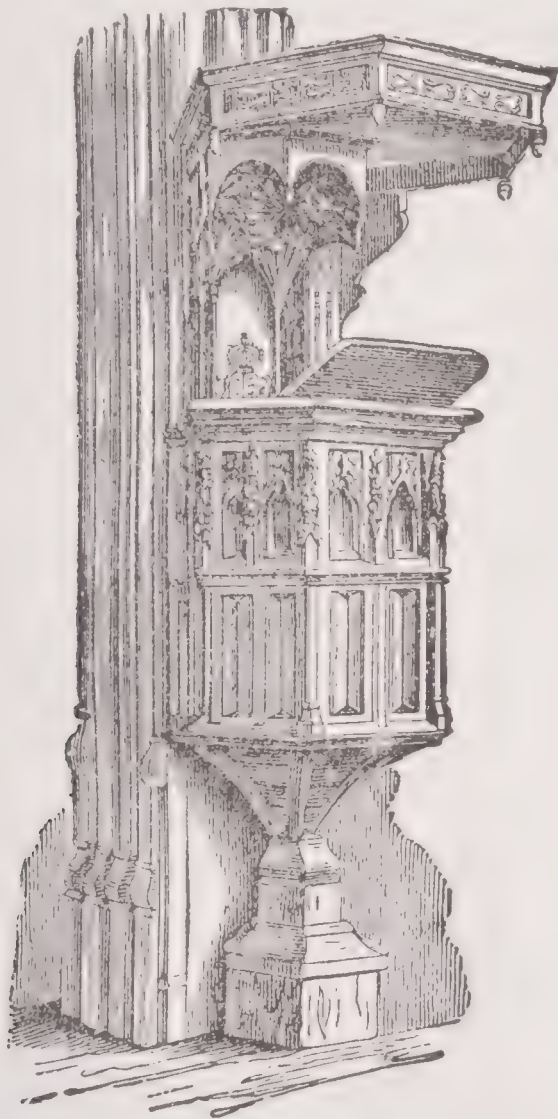
Pullman, George Mortimer, an American inventor; born in Chautauqua co., N. Y., March 3, 1831; learned the cabinet-maker's trade; settled in Chicago; studied for many years the problem of making journeys by rail more comfortable; and as a result invented the Pullman palace car. In 1863 he started building these cars, and in 1867 organized the Pullman Palace Car Company. He also invented the vestibule train and founded the town of Pullman, Ill., in 1880. He died in Chicago, Oct. 19, 1897.

Pulmobranchiata, an order of gastropod mollusks (also called by some natural-

Pulpit

ists Pulmonata), in which the respiratory organ is a cavity formed by the adhesion of the mantle by its margin to the neck of the animal. The greater part of them are terrestrial, among these being the snails and slugs.

Pulpit, formerly, a stand from which disputants pronounced their dissertations and authors recited their works; a rostrum.



"PULPIT (FOTHERINGHAY, NORTHAMPTONSHIRE, 1440).

Now, a raised place or desk in a church, from which the preacher delivers his sermon. They are now generally made of wood, but were formerly also made of stone, richly carved and ornamented. Hence, used figuratively, for preachers generally or preaching; the teaching of preachers.

Pulque, a vinous beverage, made in Mexico, by fermenting the juice of the various species of the agave. It resembles cider, but has a disagreeable odor, like that of putrid meat.

Pulse, in physiology, the beat or shock felt in any artery when slight pressure is made on it, caused by the systole of the heart. At birth the number of beats are about 140, at the end of the first year 120, at the end of the second 110; during middle life between 70 and 80, and in old age usually a little more. It is slower in man than in woman, and is also affected by the position of the body, being about five beats

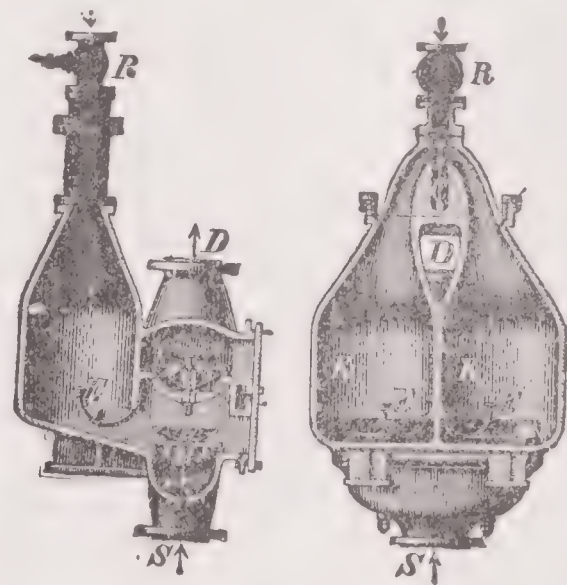
Pulszky

more in the sitting than in the recumbent posture, and 10 more per minute in the standing than in the sitting posture. To feel one's pulse is to sound one; to try to discover one's opinions, views, or feelings.

Pulse, a general name for leguminous plants or their seeds; leguminous plants, such as beans, peas, etc.

Pulse Glass, an instrument invented by Franklin to exhibit the ebullition of liquids at low temperatures. The bulbs are connected by a slender stem and partially charged with water, the supernatant air having been expelled by boiling, and the opening hermetically sealed by a blow pipe. By grasping one of the bulbs the heat of the hand will cause the formation of vapor and drive the liquid into the other bulb, producing a violent ebullition in the latter.

Pulsometer, a form of pump for raising water, by the condensation of steam, in a vessel situated at such elevation above the



PULSOMETER.

D, delivery pipe; R, inlet steam valve; E, inlet water valve; K, water chambers; S, supply pipe.

water supply that the atmospheric pressure will raise the water to the chamber and operate the valves.

Pulszky, Francis Aurelius, a Hungarian politician and author; born in Eperies, Sept. 17, 1814. After a course of legal studies he traveled abroad, publishing (1837) a successful book on England. In 1848 he was appointed to a government post under Esterhazy, but, suspected of sharing in the revolution, fled to London, where he wrote for the papers. When Kosuth went to England Pulszky became his companion, and went with him to the United States (described in "White, Red, and Black," 1852, written with his wife). He was condemned to death by the Austrian government in 1852, but, after living in Italy, 1852-1866, was pardoned in 1867. He sat in the Parliament, and was director of museums and libraries throughout the

Pulzsky

country. His autobiographic memoirs (4 vols. 1879-1882) were translated into German. He died Sept. 9, 1897.

Pulzsky, Therese, a Hungarian prose-writer, wife of Francis Aurelius; born in Vienna, in 1815. She accompanied her husband on Kossuth's American tour (see his name for their joint work). She wrote independently: "Memoirs of a Hungarian Lady" (1850); "Tales and Traditions of Hungary" (1851). She died in 1866.

Pultawa. See **POLTAVA**.

Pulteney, William, Earl of Bath, an English statesman; born in 1682. He was a student at Oxford, where his oratorical power was early displayed. He entered Parliament as member for Heydon, Yorkshire, and was a most graceful and brilliant speaker, full of epigram, and a master of all the arts of parliamentary attack. At first, and for many years, the friend and colleague of Walpole, he finally became so disgusted with that minister's indifference to his claims that in 1728 he placed himself at the head of a small group of malcontent Whigs styled the "Patriots," and was henceforth Walpole's bitterest and perhaps most formidable opponent, being the leader of the coalition against him in the Commons as Carteret was in the House of Lords. He was Bolingbroke's chief assistant in the paper called the "Craftsman," which involved him in many political controversies, and called forth some of his finest pamphlets. In 1731 he wrongly ascribed to Lord Hervey the authorship of a scurrilous pamphlet; a duel was the consequence, fought with swords in St. James's Park, when both combatants were slightly wounded. On the resignation of Walpole in 1741 Pulteney was sworn of the privy-council, and soon afterward created Earl of Bath; and from that time his popularity was gone. Horace Walpole places him among his "Royal and Noble Authors," but though his prose was effective and his verse graceful, he was probably still better known as the author of a very popular political song, "The Honest Jury, or Caleb Triumphant," than by his more serious writings. He died in 1764.

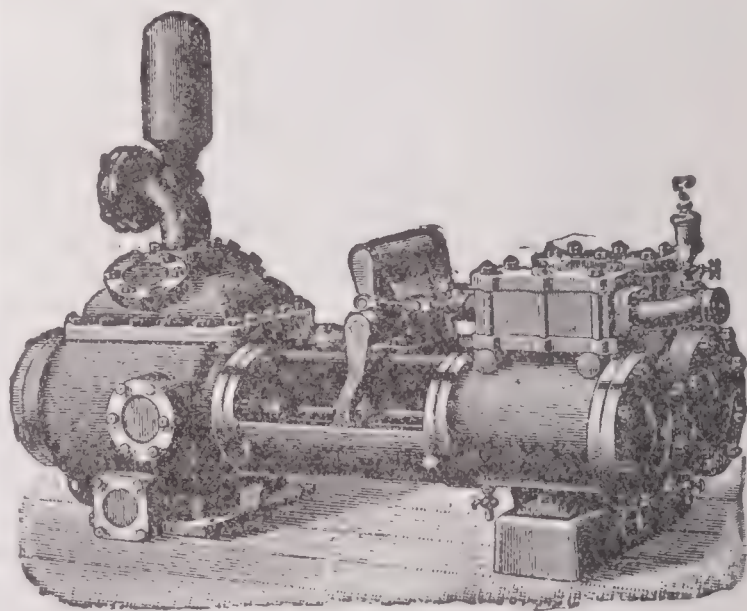
Pulu, a vegetable silk; a yellow fiber, like that of cotton, but shorter, weaker, and more elastic; imported into Europe from Hawaii since 1844. It is used for stuffing mattresses; as a styptic, etc.

Pultusk, a town of Poland, 32 miles N. of Warsaw. Here Charles XII. of Sweden defeated the Saxons in 1703, and here, too, Dec. 26, 1806, was fought a fierce battle between the Russians and the French, the latter being ultimately victorious. The town was destroyed by fire in 1875. Pop. about 10,000.

Pumice

Pulvermacher Chain, a form of galvanic battery consisting of a series of small wooden cylinders on which a zinc and copper wire are coiled side by side, but without touching each other. The zinc of one cylinder, touching the copper of the adjacent one, forms with it a couple. The whole is immersed in vinegar diluted with water. A chain of 120 couples forms a very powerful battery.

Puma, the *Felis concolor*, the cougar of the French, the *leon* of the South Americans, and the panther or "painter" of the trappers. It is the largest feline of the New World, measuring 40 inches from the nose to root of tail, which is about 20 inches more; the head is small, mane absent; general color of upper surface tawny yellowish-brown, varying in intensity in different individuals; lower parts of the body and inner surface of limbs dirty white. The young, when born, are spotted with brown, and the tail is ringed. The puma is destructive, and slays far more than it can eat, but rarely, if ever, attacks man, and may be tamed with little difficulty. Edmund Kean had one which followed him about like a dog. It ranges from Canada to Patagonia, being most numerous in the forest districts of Central America.

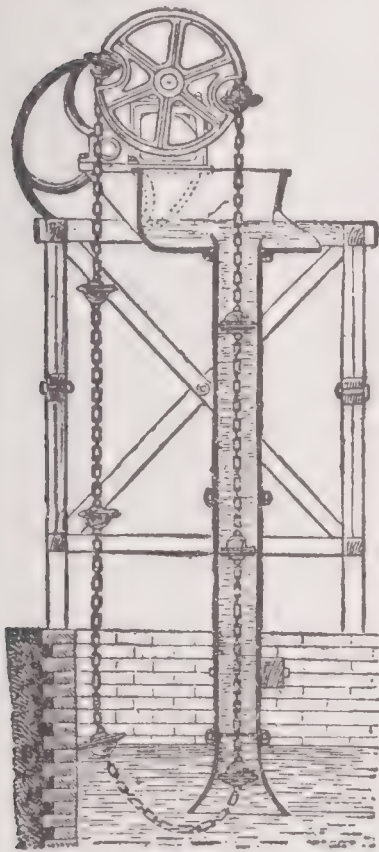


STEAM PUMP.

Pumice, a very porous, or cellular, froth-like rock, of extreme lightness, floating on water. Structure, web-like, consisting of vitreous threads either intimately interwoven or parallel. Like the more compact forms of vitreous lavas, it varies much in chemical composition, which, however, is mostly that of trachytic rocks. It owes its cellular structure to the enormous expansion of aqueous vapor consequent on the relief from pressure during the extrusion of vitreous lavas at the earth's surface. In commerce, pumice stone. It is imported from the Lipari Isles, and is used for polish-

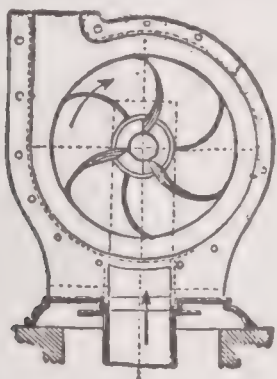
ing metals and marble, and smoothing the surface of wood and pasteboard. It is said to be a good glaze for pottery.

Pump, a machine, engine, or device, consisting of an arrangement of a piston, cylinder, and valves, for raising water or other



CHAIN PUMP.

liquid to a higher level, or for compressing or exhausting air and other gases. There are numerous varieties of pumps differing more or less in construction, according to the purposes for which each is intended, but the most important are the suction pump, the lifting or lift pump, the force pump, and the centrifugal or rotary pump. The simplest form of pump is that of the common lift pump, which consists of a straight tube with two valves, one of which is fitted to the lower end of the tube, and the other



CENTRIFUGAL PUMP.

is made to slide airtight in the cavity of the tube or barrel. Both of these valves are adapted to open upward only, and thus the water is admitted and lifted from the lower part of the tube to the discharge aperture above. The pump acts by the pressure of the atmosphere upon the external body of water from which the supply is raised, but by the forcing pump water may be raised above the level to which it is driven by the pressure of the atmosphere. The forcing pump consists of a barrel fitted with a solid piston or forcer, the barrel being also provided with a branch forcing pipe. The lower part of the barrel and the branch pipe are each fitted with a valve opening upward, and by repeated strokes of the piston, the pressure of the air from above being removed, the fluid is brought up to fill the space between the two valves, and being prevented from returning by the lower valve, it passes through the upper valve of the branch pipe into a capacious upper vessel, and there accumulating, may be ejected in a constant instead of an intermittent stream.

Pump, a light shoe, or slipper, with a single unwelted sole, and without a heel; chiefly worn by dancers. They were formerly ornamented with ribbons formed into the shape of flowers.

Pumpelly, Raphael, an American geologist; born in Oswego, N. Y., Sept. 8, 1837. In his early life he conducted explorations for the governments of Japan and China; was professor at Harvard for several years; and from 1879 to 1892 geologist in charge of the Archæan division of the United States Geological Survey. His chief works are: "Geological Researches in China, Mongolia, and Japan" (1867); "Across America and Asia" (1870); "Mining Industries of the United States" (1886); "Geology of the Green Mountains" (1894); etc.

Pumpnickel, a species of coarse bread, made from unbolted rye, which forms the chief food of the Westphalian peasants. It is slightly acid, but very nourishing.

Pumpkin, the *Cucurbita pepo*, or more loosely any gourd akin to it. The pumpkin has rough leaves, the flowers large, solitary; corolla hardly cut half way down into fine yellow petals; stamens three, inserted low down in the calyx, anthers connate. It is a native of Astrachan, but is now cultivated throughout India and other parts of the tropics; also in the United States. It is raised in the open air. The young tender leaves are eaten instead of spinach; the fruit is used for soup, or in the Northern United States in pumpkin pies, or is baked with pears, etc., in tarts; when young, it is boiled like vegetable marrow. The seeds are considered to be anthelmintic.

Pun, a play on words, the wit of which depends on a resemblance in sound between two words of different and perhaps contrary meanings, or on the use of the same word in different senses, etc.

Puna. See POONA.

Punch (Hindu *panch* = five, from its consisting originally of five ingredients, viz., aqua-vitæ, rose-water, juice of citron, sugar, and arrack), a beverage produced from India, and now compounded of spirit (whisky, brandy, rum, etc.), water (or milk), lemon juice, sugar, and spice.

Punch, with his wife Judy and dog Toby, the chief characters in a popular comic puppet show, of Italian origin, the name being a contraction of Punchinello, for Pulcinello, the droll clown in Neapolitan comedy. The word is a diminutive from *pulcino*, "a young chicken." The full-grown modern drama, which can scarcely be looked on as a school of the domestic virtues, is ascribed to an Italian comedian, Silvio Fiorillo, about 1600. The exhibition soon found its way into other countries, and

was very popular in England during the 17th century. Its popularity seems to have reached its height in the time of Queen Anne. In 1812 Ouseley saw at Tabriz, in Persia, a gipsy puppet show very like our Punch and Judy. The performance of Punch, as generally represented, requires the assistance of only two persons — one to carry the theater and work the figures, the other to bear the box of puppets, blow the trumpet, and sometimes keep up the dialogue with the hero of the piece. The movements of the puppets are managed simply by putting the hands under the dress, making the second finger and thumb serve for the arms, while the forefinger works the head.

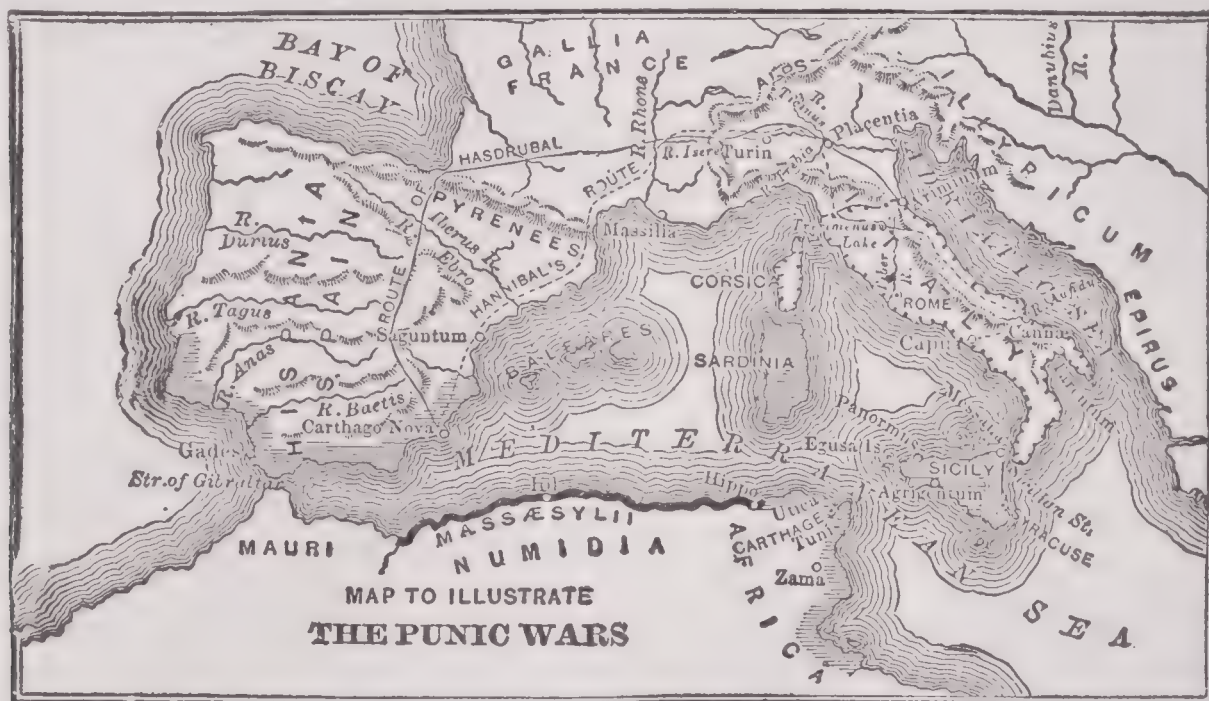
Punch, or the **London Charivari**, the chief of English comic journals, a weekly magazine of wit, humor, and satire in prose and verse, illustrated by sketches, carica-

Punch Pliers, an instrument or tool used by shoemakers, and for mutilating tickets to prevent their being used a second time. One jaw has a hollow punch, and the other forms a flat die against which the punch operates.

Puncheon, a liquid measure of capacity containing from 84 to 120 gallons.

Punchinello. See PUNCH.

Punctuation, the act, art, or method of punctuating or pointing a writing or discourse; the act, art, or method of dividing a discourse into sentences, clauses, etc., by means of points or stops. Punctuation is performed with four points or marks, viz., the period (.), the colon (:), the semicolon (;), and the comma (,). The other points used in composition are the note of interrogation or inquiry (?), and of exclamation, astonishment, or admiration (!). The first printed books had only ar-



tures, and emblematic devices. It was founded in 1841, the first number appearing July 17 of that year, and, under the joint editorship of Henry Mayhew and Mark Lemon, soon became a household word, while ere long its satirical cuts and witty rhymes were admitted a power in the land. "Punch" is recognized as an English institution. Their contributions to "Punch" helped to make Douglas Jerrold, Gilbert & Beckett, Tom Hood, Albert Smith, Thackeray, Shirley Brooks, Tom Taylor, and F. C. Burnand famous; as their illustrations did H. K. Browne, Doyle, Leech, Tenniel, Du Maurier, Keene, Linley Sambourne, and Furniss. It should be noted that this comic paper has done memorable service in purifying the moral standard of current wit in England.

Punchayet, a native jury of arbitration in Hindustan. Every caste has a separate punchayet to decide on offenses against its regulations.

bitrary marks here and there, and it was not till the 16th century that an approach was made to the present system by the Manutii of Venice.

Pundit. See PANDIT.

Pungwe, a river of Portuguese East Africa, forming the principal waterway to Manicaland and Mashonaland; its mouth is situated about 25 miles N. E. of Sofala and 130 S. W. of the Zambesi delta. After some diplomatic difficulties between Great Britain and Portugal, it was agreed (1891) by Portugal that British commerce should have unimpeded access by this route to the British sphere in the interior, the Pungwe being made freely navigable for British vessels. In 1894 nearly 200 miles of the railway to the interior had been laid.

Punic, the language of the Carthaginians. It was an offshoot of Phœnician, belonging to the Canaanitish branch of the Semitic tongues.

Punic Wars, three great wars between the Romans and the Carthaginians. The

first (264-241 B. C.) was for the possession of Sicily, and ended by the Carthaginians having to withdraw from the island. The second (218-202 B. C.), the war in which Hannibal gained his great victories in Italy, was a death struggle between the two rival powers; it ended with decisive victory to the Romans. The third (149-146 B. C.) was a wanton one for the destruction of Carthage, which was effected in the last-named year.

Punishment, a penalty inflicted on a person for a crime or offense, by the authority to which the offender is subject; a penalty imposed in the enforcement or application of law. The punishments usual for criminal offenses in the United States are death by hanging or electricity, penal servitude, imprisonment with and without hard labor, solitary confinement, detention in a reformatory school, subjection to police supervision, imposition of fines, and putting under recognizance. In New York and Ohio the death penalty is inflicted by electrocution, and in Delaware whipping is resorted to as a punishment for certain offenses. By Article VIII of the amendments to the Constitution of the United States it is provided that "Excessive bail shall not be required, nor excessive fines imposed, nor cruel, and unusual punishments inflicted."

Punjab, an extensive territory in the N. W. of India, most of it under direct Anglo-Indian authority, and ruled by a lieutenant-governor, a large portion of the remainder constituting the protected state of Kashmir.

Punjnud, the name given to the stream which pours into the Indus, about 70 miles above the Sind frontier, the combined waters of the five rivers, the Sutlej, the Beas, the Ravi, the Chenab, and the Jhelum.

Punka, or **Punkah**, a large, broad fan, suspended from the ceiling, or a number of such fans, acting simultaneously, and worked by an attendant. It is common in India, being suspended over a table or bed. It has a line attached to one end, which passes through the wall or door to an attendant outside.

Punt, a large, square-built, flat-bottomed vessel, without masts, used as a lighter for conveying goods, etc., and propelled by poles. Also, a small, flat-bottomed boat, with square ends, used in fishing, and propelled by poles.

Punta Arenas, the name of several cities and towns: (1) The chief port of Costa Rica on the Pacific, on a "sandy point" jutting into the Gulf of Nicoya, and connected by railway with Esparza, 14 miles E. N. E. The principal export is coffee, and after that india-rubber, hides, dye-

woods, and tortoise-shell. Pop. 8,000. (2) A town in Patagonia.

Pupa, or **Pupe**, in entomology, the third stage in the development of an insect (see CHRYsalis: NYMPH). On reaching its full growth the larva ceases to eat, and some time later becomes encased in a closed shell or case, whence after a certain lengthened period, which typically is one of repose, it emerges as a perfect insect. In zoölogy and palæontology, chrysalis-shell; a genus of *Helicidæ*. Shell rimate or perforate, cylindrical, or oblong; aperture rounded, often toothed; margins distant, mostly united by a callous lamina. Recent species, 256, widely distributed in both hemispheres; fossil 40, from the Coal-measures of America and the Eocene of Europe. Three recent sub-genera: *Vertigo*, *Axis*, and *Stenogyra*.

Pupin, **Michael Idvorsky**, an American scientist; born in Idvar, Hungary, Oct. 4, 1858; was graduated at Columbia University in 1883; studied at the University of Berlin; and was appointed Adjunct Professor of Mechanics at Columbia University in 1889. In 1901 he announced the discovery of a new method of ocean telephony. He was a member of the American Mathematical Society, American Philosophical Society, etc. He wrote "Propagation of Long Electrical Waves"; "Wave Propagation Over Non-Uniform Conductors"; etc.

Puppet Shows, the performances of images of the human figure moved by fingers, cords, or wires, with or without dialogue. Puppets in English, French *marionettes*, Italian *fantoccini*, are of great antiquity. In early times in England puppet shows were called "motions," and generally represented some scriptural subject. In later times they have ranged from Punch and Judy (see PUNCH) to representations of shipwrecks and battles. During recent years a higher than the street public have patronized elaborate performances by puppets, chiefly Italian.

Purana, the last great division of Hindu sacred literature. Eighteen principal Puranas are enumerated, called Brâhma, Pâdma, Brahmânda, Agni, Vishnu, Gâruda, Brahmavaivarta, Siva, Linga, Nâradiya, Skanda, Mârkandeya, Bhavishyat, Mâtsya, Vâraha, Kaurma, Vâman, and Bhâgavat. None of them is dated. Some quote from others, and the period of their redaction embraces perhaps a dozen centuries. In their present form none of them appears older than the 9th century A. D. The most celebrated are the Vishnua and the Bhâgavat Purânas. They are full of legends relating to holy places and ceremonial rites, with minute fragments of history. Modern Hinduism is largely founded on these compositions, some of which are sectarian pro-

Purbeck

ductions, advocating the claims of particular divinities to the disparagement of others. In addition to the 18 principal Purânas, there are 18 Upapurânas or secondary Purânas, enumerated by H. H. Wilson, and these do not complete the list of Puranic literature.

Purbeck, Isle of, a peninsula S. of Dorsetshire, so separated from the mainland on the N. by Poole harbor and the Frome as to be connected with it by only a very narrow isthmus. It is about 12 miles long by 7 miles broad. The prevailing rock is limestone.

Purbeck Beds, in geology, a series of beds generally considered the highest part of the Upper Oölite; but meriting, according to Etheridge, a distinct place, as between it and the Oölite there is a complete break, stratigraphically and palæontologically. The Purbeck beds chiefly consist of freshwater limestones, clays, shales, and sandstones.

Purbeck Limestone, a fresh-water limestone in the Purbeck. Formerly used as a synonym of the whole PURBECK BEDS (*q. v.*). It has been employed for paving.

Purbeck Marble, a marble full of Paludina shells, found in the Upper Purbeck. It has been used as a building stone for cathedrals, etc.

Purcell, Henry, an English composer; born in 1658. He was the son of a musician of the chapel-royal. When quite young he was admitted a chorister of the chapel-royal, where he studied music under Dr. Blow among other teachers, and in 1679 he became organist of Westminster Abbey, and in 1682 of the chapel-royal, holding both appointments conjointly. In 1680, probably, he composed for a private seminary "Dido and Eneas," which has been called the first genuine English opera, but has never been produced on the public stage. For some years after he became organist of Westminster Abbey he composed mainly anthems and sacred music, all of great excellence. In 1690 he wrote the music for Dryden's version of "The Tempest." In 1691 he produced the music to Dryden's "King Arthur," which, though considered his dramatic masterpiece, was not published till 1843. In 1694 he wrote, for St. Cecilia's Day, his great works "The Jubilate" and "Te Deum," and in 1695 the music to "Bonduca," in which was "Britons, Strike Home." Purcell was equally great in church music, chamber music, and music for the theater. He died in 1695, and was buried in Westminster Abbey.

Purchas, Samuel, an English clergyman; born in Thaxted, Essex, England, in 1577. He was educated at Cambridge. He was presented by the king in 1604 to the

Purgatory

vicarage of Eastwood, which he soon resigned to his brother, as the chosen labor of his life required residence in London. Later he became rector of St. Martin's, Ludgate, and chaplain to Archbishop Abbot. His great works were "Purchas, His Pilgrimage, or Relations of the World and the Religions Observed in All Ages" (1613: 4th ed. much enlarged, 1626), and "Hakluyt's Posthumus, or Purchas His Pilgrimes: Containing a History of the World, in Sea Voyages and Land Travels by Englishmen and Others" (4 vols. folio, 1625). Another work is "Purchas His Pilgrim: Microcosmus, or the History of Man; Relating the Wonders of His Generation, Varieties in His Degeneration, and Necessity of His Regeneration" (1619). He died in London, in September, 1626.

Purchase, in law, the suing out and obtaining a writ; the obtaining or acquiring the title of lands and tenements by money, deed, gift, or any means except descent. In mechanics, a means of increasing applied power; any mechanical hold, advantage, power, or force applied to the raising or removing of heavy bodies: mechanical advantage gained by the application of any power. To be worth so many years' purchase, said of property which will return in the specified term of years a sum equal to that paid for it. Thus, an estate bought at 20 years' purchase will return in 20 years a sum equivalent to that paid for it. Hence this and similar phrases are used figuratively, as when we say that a man's life is not worth an hour's purchase; that is, is in extreme peril, or is not likely to last an hour.

Purdue University, a coeducational non-sectarian institution in Lafayette, Ind.; chartered in 1862; opened in 1874, under the auspices of the State; has endowment, \$340,000; grounds and buildings, \$960,000; volumes in the library, over 27,000; average faculty, 150; students, 2,000; graduates, over 3,300.

Purgatory, in comparative religions, any place or state succeeding the present life, and serving as a means of moral purification. In Roman theology, a place in which souls who depart this life in the grace of God suffer for a time, because they still need to be cleansed from venial, or have still to pay the temporal punishment due to mortal sins, the guilt and eternal punishment of which have been remitted. The existence of a purgatory was defined by the Councils of Florence (1438-1439) and Trent. At the latter council it was declared that the "souls in purgatory are assisted by the suffrages of the faithful, and especially by the sacrifice of the altar." Beyond this nothing is defined, and the same decree enjoins bishops "to abstain from difficult and subtle

questions" in their discourses on the subject, and prohibits curious inquiries, superstitious practices, and the making of purgatory a source of gain as "scandals and stumbling-blocks to the faithful." In the Anglican Church, Article XXII. treats of purgatory, and most Protestants consider that it denies Scriptural evidence for the existence of such a place. High Churchmen, on the contrary, hold that the Anglican Church has no authoritative teaching on the point, and that the article is rather directed against an erroneous view of the Roman doctrine than that doctrine itself. Prayers for the dead — the natural outcome of the doctrine of purgatory — are in many instances offered privately by her members, and in some few instances publicly requested in her churches.

Purification, a Jewish rite. It was mainly the one through the performance of which an Israelite was readmitted to the privilege of religious communion, lost through uncleanness. The chief varieties of such uncleanness, and the methods of purification from it required, are detailed in Lev. xii., xiv., xv., and Numb. xix. The necessity of purification was extended after the captivity to a variety of cases not included in the Mosaic legislation, such as the washing of cups and pots, etc., referred to in Mark vii. 4.

Purification of the Blessed Virgin Mary, Feast of, a festival in commemoration of the "purification" of the Blessed Virgin Mary, in accordance with the ceremonial law of Lev. xii: 2. This ceremony was appointed for the 40th day after childbirth, which, reckoning from Dec. 25 (the nativity of our Lord), falls on Feb. 2, on which day the purification is celebrated. The history of Mary's compliance with the law is related in Luke, ii: 22-24. The date of the introduction of this festival is uncertain. The first trace of it is about the middle of the 5th century, and in the Church of Jerusalem. In the Western Church it was known to Bede. Its introduction in the Roman Church in 494 was made by Pope Gelasius the occasion of transferring to a Christian use the festivities which at that season were annexed to the pagan festival of the Lupercalia.

Purim, the Festival of Lots, which was instituted by Mordecai (Esther ix: 27-x: 3), and is celebrated to this day by the Jews on the 14th and 15th of the month Adar (March), in commemoration of their wonderful deliverance from the destruction with which they were threatened by Haman. On these festive days the book of Esther is read, presents are interchanged, and gifts are sent to the poor. The great popularity of this festival in the days of Christ may be gathered from the following

remark of Josephus: "Even now all the Jews that are in the habitable earth keep these days as festivals and send portions to one another." It is supposed that it was this feast which Jesus went up to celebrate at Jerusalem (John v: 1).

Puritan, the name given, at first perhaps in contempt, to those clergymen and others in the reign of the English Queen Elizabeth, who desired a simpler, and what they considered to be a purer, form of worship than the civil and ecclesiastical authorities sanctioned. The Puritan controversy commenced as early as 1550, when Hooper, appointed to the see of Gloucester, refused to be consecrated in the ecclesiastical vestments then in use. The name first given to those who objected to vestments and ceremonies was Nonconformists. According to Fuller it was not till 1564, or according to Strype till 1569, that the name Puritan arose. When, toward the close of Queen Elizabeth's reign, many of the Anglican clergy began to lean toward Arminianism, the Puritans remained sternly Calvinistic. New England was settled very largely by the Puritans. Also, one who has severely strict notions as to what is proper or who is strict in his religious duties.

Puritan, The, a twin-screw, iron, double-turret monitor of the United States navy, for coast defense; 6,060 tons displacement; length 289 feet, 6 inches; breadth, 60 feet, 1½ inches; mean draft, 18 feet; horse power 3,700; armor 14 inches on the sides, 8 inches on the turrets, and 14 inches on the barbettes; main battery four 12-inch breech-loading rifles and two 4-inch rapid-fire guns; secondary battery six 6-pounder rapid-fire guns, four Gatlings and two 37-millimeter Hotchkiss revolving cannons; speed 12.4 knots; crew 22 officers and 208 men; cost, \$3,178,046.

Puritan City, Boston, Mass., a name referring both to its founders and to the supposed characteristics of its modern inhabitants.

Purkinge's Figures, in optics, figures produced on a wall of uniform color when a person entering a dark room with a candle moves it up and down approximately on a level with the eyes. From the eye near the candle an image of the retinal vessels will appear projected on the wall.

Purl, a beverage made by warming a pint of ale with a quarter of a pint of milk, and adding sugar and a wine-glassful of gin, rum, or brandy.

Purple Black, a preparation of madder, of a deep purple hue, approaching to black; its tints, with white-lead, are of a purple color. It is very transparent and powerful, glazes and dries well in oil, and is a durable and eligible pigment, belonging perhaps to the semi-neutral class of marone.

Purple Colors

Purple Colors. Painters in oil and water-colors produce various shades of purple by mixing certain red and blue pigments. For work in oil French ultramarine, often called French blue, is mixed with vermilion or some madder red (madder carmine is best), or one of these reds with cobalt blue if a pale purple is wanted. For permanent purples in water-colors the same blues are used; but one of the madder reds, not vermilion, should be mixed with them. A much richer purple than any of the above mixtures will give is produced by Prussian blue and one of the lakes from cochineal—viz., carmine or crimson lake—but it is not permanent. This purple, as well as that obtained by mixing Indian red with indigo, also fugitive, was much used by water-color painters in past years. Purple madder is the only simple purple pigment available for the artist which is durable, and it is unfortunately costly. All purples are changed to neutral and gray tints by the addition of any yellow pigment. For house-painting maroon lake with a little French blue gives a useful purple; but some of the above mixtures also are occasionally used.

There are several ways of dyeing textile fabrics of a purple color. The most famous of all ancient dyes was the Tyrian purple, which is said to have been discovered at Tyre many centuries before the Christian era. Among the Romans this color was exclusively employed for dyeing the imperial robe. It was obtained from shellfish belonging to the genera *Murex*, *Purpura*, and *Buccinum*; at least it has been supposed that it was prepared from one or more species of each of these. The color was so costly that in the time of Augustus one pound of it sold for what would amount to \$180. About the year 1851 what is believed to be the same or a closely similar purple was obtained from uric acid by a peculiar treatment. Archil seems to have been the only simple purple dye known in the Middle Ages. Purple of Cassius is a compound of gold and tin used in coloring GLASS (*q. v.*), and in porcelain and enamel painting. It was discovered at Leyden by Andrew Cassius about 1683. A preparation of this color was formerly used for painting miniatures in water-color; but for this purpose purple madder, being cheaper, has taken its place.

Purple Emperor, the *Apatura* or *Nymphalis Iris*, a large, somewhat rare, and richly-colored British butterfly: so called from the splendid purple iridescent color of its fore wings.

Purple Heron, in ornithology, the *Ardea purpurea*, about the same size as the common heron (*A. cinerea*), but of much darker plumage; the occipital plumes are glossy black, tinged with purple.

Purse Crab

Purples, Ear Cockle, or Peppercorn, a disease affecting the ears of wheat, produced by the *Tylenchus* or *Vibrio tritici* ("wheat eel"), one of the Infusioria. The infected grains of wheat at first assume a dark-green color, which soon deepens to a black, and become rounded like small peppercorns. The husks open, and the diseased grains are found to contain no flour, but a moist substance. A single grain of wheat may contain 50,000 young vibrios. These forms may be dried, and restored again on the application of moisture. Dilute sulphuric acid, in the proportion of 1 of acid to 100 parts of water, destroys the vibrio effectually.

Purple Wood, a species of wood from the Brazils, the heart wood of *Copaifera pubiflora* and *C. bracteata*. It is a handsome wood of a rich plum color, very strong, durable, and elastic. It is imported in logs from 8 to 12 inches square, and 8 to 10 feet long, principally used for ramrods, buhl-work, marquetry, and turnery. Called also purple heart.

Purpura, in zoölogy, a genus of *Buccinidae*; shell striated, imbricated, or tuberculated; spine short, aperture large, slightly notched in front, upper lip much worn and flattened. Recent species 140, very widely distributed, ranging from low-water to 25 fathoms. Many yield a dull crimson dye, formerly utilized. *P. lapillus*, the sole British species, abounds on the coast at low water, and is very destructive to mussel beds. Forty fossil species, commencing in the Tertiary and coming down to the Pleistocene. Also, a peculiar unhealthy condition of the blood and tissues, evinced by purple spots, chiefly on the legs, due to unhealthy surroundings, want of proper food, intemperance, and other depressing causes; it sometimes accompanies chronic diseases. It may be simple or hæmorrhagic, acute or chronic, and if uncomplicated usually ends in recovery.

Purree, a yellow coloring matter imported from India and China, supposed to be obtained from the urine of camels, elephants, and buffaloes. It is brown on the outside, of a deep orange color within, and is used in the preparation of INDIAN YELLOW (*q. v.*).

Purse, a specific sum of money. In Turkey it consists of 500 Turkish piastres, and its value is \$22; in Egypt a purse consists of 500 tariff piastres, value \$25; in Persia, 50 tomans, value \$107.

Purse Crab, a name for decapod crustaceans of the genus *Birgus*, allied to the hermit crabs. A species, *B. latro* (the robber crab), found in the Mauritius and the more E. islands of the Indian Ocean, is one of the largest crustaceans, being sometimes two to three feet in length. It resides on land, while paying a nightly visit to the

sea, often burrowing under the roots of trees, lining its hole with the fibers of the cocoanut husk and living on the nuts, which (according to some writers) it climbs the trees to procure, and the shells of which it certainly breaks with great ingenuity.

Purser, on shipboard, the officer whose duty is to keep the accounts of the ship to which he is attached. In mining, the paymaster or cashier of a mine, and the official to whom notices of transfer are sent for registration in the cost-book.

Purslane, a plant of the genus *Portulaca* (*P. oleracea*), with fleshy succulent leaves, naturalized throughout the warmer parts of the world. Purslane was formerly more used than at present in salads as a pot herb, in pickles, and for garnishing. It has anti-scorbutic properties.

Pursuivant, in heraldry, an attendant on the heralds; one of the third and lowest order of heraldic officers. There are four pursuivants attached to the English College of Arms, styled Rouge Croix, Blue Mantle, Rouge Dragon, and Portcullis. To the court of Lyon King-of-Arms, in Scotland, there were formerly six pursuivants attached, viz., Unicorn, Carrick, Bute, Kintyre, Ormond, and Dingwall, but the last three have been abolished.

Puru, or **Purus**, a river of South America, which rising in the E. of Peru enters Brazil, and flowing N. E. after a course of 400 miles joins the Amazon about 100 miles above the confluence of the Madeira with the latter.

Purves, George T., an American clergyman; born in Philadelphia, Pa., Sept. 27, 1852; was graduated at the University of Pennsylvania in 1872 and at the Princeton Theological Seminary in 1876; was pastor of the Presbyterian Church in Wayne, Pa., in 1877-1880; and Professor of New Testament Literature and Exegesis at the Princeton Theological Seminary in 1892-1900, when he accepted a call to the Fifth Avenue Presbyterian Church, New York city. He wrote "The Testimony of Justin Martyr to Early Christianity"; "The Apostolic Age"; etc. He died in New York city, Sept. 24, 1901.

Purveyance, formerly in England the exercise by officials called purveyors of the royal prerogative, involving a right of pre-emption, by which the king was authorized to buy provisions and necessities for the use of his household at an appraised value, in preference to all his subjects, and even without the consent of the owner; it included the right of impressing horses and carriages, etc., for the use of the sovereign. It was also practised by many of the great English nobles. It led to much oppression and many exactions, and a number of statutes were passed to prevent them.

Pus, in physiology and pathology, the product of suppuration, a thick, viscid, yellow fluid, consisting of *liquor puris*, pus corpuscles, and other histological particles. It may be healthy or laudable, ichorous or watery, purulent or serous, sanious, etc., and it may become cheesy or even ultimately calcify.

Pusey, Caleb, an American Quaker colonist; born in Berkshire, England, about 1650. He came with Penn's company to America in 1682, erected the first mills in the province, held many high places in civil affairs, and was a noted controversialist writer of his day. He published a great number of pamphlets and articles in defense of his creed, among them: "A Serious and Seasonable Warning," etc. (1675); "A Modest Account from Pennsylvania of the Principal Differences in Point of Doctrine between George Keith and those of the People called Quakers" (1696); "Satan's Harbingers Encountered," etc. (1700). He died in Chester co., Pa., Feb. 25, 1727.

Pusey, Edward Bouverie, an English theological writer, a leader of the Anglo-Catholic (Tractarian) party in the Established Church; born near Oxford in 1800. He was associated with Newman and others in the "British Critic," "Tracts for the Times," etc., and his conspicuousness from his social position (nephew of one earl and grandson of another, professor and canon of Christ Church), wealth, and munificent charities, caused the Oxford Movement to be known as "Puseyism," though he was not its initiator and did not at first sympathize with it. He published: "An Historical Enquiry into the Probable Causes of the Rational Character Lately Predominant in the Theology of Germany" (1825); "The Holy Eucharist a Comfort to the Penitent" (1843), a sermon which resulted in his suspension for three years; two sermons on "The Entire Absolution of the Penitent" (1846), equally revolutionary; other sermons on "The Rule of Faith as Maintained by the Fathers," etc. (1861), and on "The Presence of Christ in the Holy Eucharist" (1853). Of his larger works the most important are: "The Doctrine of the Real Presence" (1855); "The Real Presence of the Body and Blood of Christ the Doctrine of the English Church" (1857); "An Eirenicon." He died Sept. 16, 1882.

Pushkin, Alexander. See **POUSHKIN**.

Pushtu, or **Pukhtu**, the language of the Afghans proper (see **AFGHANISTAN**). It is, according to Darmesteter, not intermediate between the Iranic and Indic branches of the Aryan stock, but is directly derived from the Zend, with Persian, Hindustani, and Arabic admixture.

Pustule, a pimple, a little blister. Also a vesicle containing pus, as in *ecthyma*,

furunculus, and smallpox. Malignant pustule or charbon is a disease transmitted to man from sheep or oxen, occasionally from horses, to some exposed part, lip or face usually, and nearly always fatal.

Putchock, or **Putchuk**, the roots of *Aplotaxus lappa* (*Saussurea Lappa*, *Calc*, Exhib. Rep.). It is a tall composite plant, with purple florets, growing on the mountains of Cashmere, at an elevation of 8,000 or 9,000 feet. The root is collected in enormous quantities, and exported to China, to be used as incense. It has an odor like orris root, a pungent, aromatic taste, and is used as a perfume. It is given in India in cough, asthma, fever, cholera, dyspepsia, etc. Its dried powder is the principal ingredient in an ointment for ulcers; it is also a hair wash.

Puteaux, a town 2 miles from the W. boundary of Paris, on the left bank of the Seine, opposite to the Bois de Boulogne. Many Parisians have fine villas here. There are manufactures of dyestuffs and chemicals, dyeing, and calico printing. Pop. about 15,000.

Puteoli, See POZZUOLI.

Putlitz, Gustav Heinrich Gans, Edler Herr von und zu, a German poet and novelist; born in Retzien, Prussia, March 20, 1821. He began his literary career by writing a number of little comedies dealing with high social life, all in a vein of lively humor; among them are: "The Heart Forgotten"; "Watering-Places"; "Family Quarrels." He wrote also some exquisite short tales—"What the Forest Tells," "Forget-me-not," "Arabesques"; "Don John of Austria," a tragedy (1863), and numerous other plays; also a series of novels—"The Alpine Bride" (1870), "Sparks 'Neath the Ashes" (1871), "The Nightingale" (1872); and "My Home: Recollections of Childhood and Youth" (1885). He died in Retzien, Sept. 9, 1890.

Putnam, Eleanor. See BATES, HARRIET LEONORA (VOSE).

Putnam, Frederick Ward, an American scientist; born in Salem, Mass., April 16, 1839; was graduated at Harvard University in 1862; became curator of ornithology at the Essex Institute in Salem in 1856, superintendent of the East Indian Marine Society's Museum there in 1867, and chief of the Department of Ethnology at the World's Columbian Exposition in Chicago in 1893. He was a member of numerous American and foreign scientific societies. The French government gave him the Cross of the Legion of Honor. He edited many volumes of the "Annual Reports of the Trustees of the Peabody Museum of Archæology and Ethnology," and "Proceedings of the Essex Institute."

Putnam, George Haven, an American publisher and author, son of George P.; born in London, England, April 2, 1844. He entered the publishing business in 1866, and was the head of the firm of G. P. Putnam's Sons, New York. His works include: "International Copyright" (1879); "Authors and Publishers" (1883); "Authors and their Public in Ancient Times" (1893); "Books and their Makers during the Middle Ages" (1896).

Putnam, George Palmer, an American publisher and author; born in Brunswick, Me., Feb. 7, 1814. In 1848 he established the publishing house now conducted under the name of G. P. Putnam's Sons; and also founded "Putnam's Magazine," which was subsequently merged with "Scribner's Monthly." His works include: "The Tourist in Europe" (1838); "American Facts" (1845); "The World's Progress" (1850); "Ten Years of the World's Progress"; etc. He died in New York, Dec. 20, 1872.

Putnam, Herbert, an American librarian; born in New York city, Sept. 20, 1861; was graduated at Harvard in 1883; studied at the Columbian Law School; was admitted to the Minnesota bar in 1886; librarian of the Boston Public Library in 1887-1891; and was appointed librarian of Congress in 1899.

Putnam, Israel, an American general in the Revolutionary War; born in Danvers (then part of Salem), Mass., in 1718. He was destined to the occupation of a farmer, and continued in that avocation till the French and Indian war broke out, when, at the age of 36, he took service in the English army, and from his known courage and energy, received the command of a company of light troops, or "rangers." When the dispute between his country and England commenced, he was following the quiet life of a farmer and tavern keeper; but the first blood that was shed aroused all his energy. He was created Major-General by Congress; and at Bunker Hill, New York, and during Washington's retreat through New Jersey, he showed himself one of the bravest and most devoted of the patriot leaders. But in 1779 he was stricken with paralysis, and was prevented from participating in the final triumphs of the national cause. His character is well depicted by the inscription on his tomb: "He dared to lead where any dared to follow." He died in 1790.

Putnam, Mrs. Mary (Lowell), an American historical writer, sister of James Russell Lowell; born in Boston, Mass., Dec. 3, 1810. In 1832 she married Samuel R. Putnam, a merchant of Boston. Besides a translation from the Swedish, and numerous magazine articles, she published: "History of the Constitution of Hungary" (1850); "Records of an Obscure Man" (1861); and two dramatic poems on the

subject of slavery, entitled "The Tragedy of Errors" and "The Tragedy of Success" (1862). She died in Boston in June, 1898.

Putnam, Mrs. Sarah A. Brock, an American novelist and writer; born in Madison Courthouse, Va., about 1845. In 1883 she married the Rev. Richard Putnam, of New York. Her works include: "Richmond during the War" (1867); "The Southern Amaranth" (1869); "Kenneth, My King" (1872); "Myra," a novel.

Putnam, William Le Baron, an American jurist; born in Bath, Me., May 12, 1835; was graduated at Bowdoin College in 1855 and admitted to the bar in 1858; practised in Portland, Me., till 1892; was a member of a commission to arrange with the British government the rights of American fishermen in Canadian waters in 1887; served also as a commissioner under the treaty of Feb. 6, 1896, between the United States and Great Britain; and was appointed a judge of the United States Circuit Court in 1892.

Putnam, Fort, the principal defense of West Point during the Revolution. Now in ruins.

Putney, a suburb of London, England, in Surrey, 6 miles W. S. W. of Waterloo, on the S. side of the Thames, which, here nearly 300 yards broad, is crossed by a granite bridge (1884-1886), leading to Fulham, and founded and opened by the Prince of Wales. It is a great rowing place, the starting point of the Oxford and Cambridge boat race; and from its ready access to town, the river, Putney Heath, and Wimbledon Common, has grown rapidly of recent years, its principal feature that there are no poor. The parish church, with a 15th century tower and the chantry of Bishop West of Ely, was mainly rebuilt in 1836; in the churchyard is Toland's grave. Putney is the birthplace of Thomas Cromwell and Gibbon, and the deathplace of Pitt and Leigh Hunt. From Putney's old bridge Mary Wollstonecraft tried to drown herself; and on Putney Heath Pitt fought his duel with Tierney (1798), Castereagh his with Canning (1809). Pop. (1901) 24,139.

Putrefaction, the apparently spontaneous decomposition of organic substances, especially those rich in nitrogen. It differs from fermentation in being accompanied by the evolution of fetid and noxious gases. In the process of putrefaction, organic bodies of a higher order are changed, sometimes into lower organic compounds, sometimes into inorganic compounds, as ammonia, sulphuretted hydrogen, etc., and sometimes into simple substances, as hydrogen and nitrogen. Putrefaction may be prevented, or its further progress arrested by various means:

(1) By keeping the substance in a vacuum, or in a vessel containing air which has been deprived of all organic germs.

(2) By freeing from moisture and keeping perfectly dry.

(3) By keeping the substance in an atmosphere a few degrees above 0°.

(4) By heating to the boiling point, and hermetically sealing.

(5) By the use of antiseptics, as salicylic acid, etc.

From experiments made by Pasteur and others, it appears that putrefaction only takes place when a body comes in contact with living germs.

Putrid Sea. See SIVASH.

Puts and Calls, terms used in American stock dealings. The trade in privileges is something which is scarcely understood outside of Board of Trade and Stock Exchange circles. For \$1 per 1,000 bushels a trader can purchase the privilege to "put" (sell) or "call" (buy) from the seller of the privilege at a stipulated price and within a stipulated time. The ordinary privileges are sold one day to be good to the close of the next session. In inactive markets the "put" and "call" prices may be close together and close to the market price of the property. They are countenanced by the State of New York and are a regular feature in the New York Stock Exchange. In Illinois they are specifically classed as gambling operations. The theory of "privileges" is that they are a species of insurance by which an operator can protect himself against market fluctuations. A trader who is "short" in the market can protect his position to a certain degree by buying "calls"; a "long" can prevent losses in the same degree by buying "puts." The insurance proposition is a theory, however, as "privileges" more often serve to originate new trades than to serve as an insurance on existing business conditions.

Puttenham, George, an English writer, regarded as the author of "The Art of Poetrie," which appeared anonymously in 1589. If its author, he was, from indications given in that and another work from the same pen, born about 1530, and became a scholar of Oxford. In 1579 he presented his "Partheniades" to Queen Elizabeth, to whom he was a gentleman usher. "The Art" is a review of ancient as well as modern poetry, and was written for the court and to instruct in versification. Its author wrote several other pieces which have been lost.

Putty, calcined tin, or oxide of tin and lead mixed in various proportions, used as polishing powder by opticians and lapidaries. In plastering, a fine mortar, nearly all lime, used in stopping crevices of shrinkage. In glazing, a composition of pounded whiting and linseed oil, beaten up into a tough, tenacious cement. It is used for securing window panes in sashes, for stopping crevices in wood-work which is to be painted,

Putty Powder

and for various other work. In pottery, the mixture of ground materials in which in potteries earthenware is dipped for glazing. In foundry work, the mixture of clay and horsedung used in making molds in foundries.

Putty Powder, a pulverized oxide of tin sometimes mixed with oxide of lead. Putty powder is extensively used in glass and marble works, and the best kinds are used for polishing plate.

Putu. See CHUSAN.

Putumayo, or **Iça**, a tributary of the Amazon, rising in Colombia, and flowing S. E. for 950 miles.

Puvis de Chavannes, Pierre, a French painter; born in Lyons, France, Dec. 14, 1824. He studied under Couture and Henri Scheffer; painted mural decorations for libraries, etc., in France, especially "Ste. Geneviève" at the Pantheon, Paris; "The Sacred Grove"; a mural painting for the Boston, Mass., Public Library (1894); etc. He died in Paris, Oct. 25, 1898.

Puy, Le, or **Le Puy-en-Velay**, a town of France (department Haute-Loire), 70 miles S. W. Lyons. It consists of the new town in a valley and the old town, this latter one of the most picturesque in France. Puy (Berry, *pui* or *peu*, "a hill") is the name commonly given in the highlands of Auvergne and the Cévennes to the truncated conical peaks of extinct volcanoes. The town of Le Puy stands on the steep slopes of Mount Anis (2,050 feet), from the summit of which starts up precipitously the basaltic mass called Mont Corneille, crowned by a colossal figure (53 feet) of the Virgin, made of Russian cannon brought from Sebastopol. The most notable building is the Romanesque cathedral (6th-12th century), with a venerated image of the Virgin and ancient cloisters; it is situated in the highest part of the town. There are other ancient and interesting churches and a museum. Lace and thread work are manufactured.

Puya, in botany, a synonym of *Pouretia*, a genus of *Bromeliaceæ* (Lindley). *P. chinensis* yields an extract used in healing broken bones, and the spike of *P. lanuginosa* is a transparent gum.

Puy-de-Dôme, a central department of France, containing an area of 3,070 square miles and a pop. (1906) of 535,419. The W. side of the department is an elevated volcanic region, studded with numerous extinct cones, and greatly broken by corries, erosion valleys, crater lakes, etc. (See FRANCE). The highest cones are Puy-de-Sancy (6,188 feet) and Puy-de-Dôme (4,806); on the E. side the Forez Mountains (5,380) march with the frontier. The principal rivers are the Allier, a tributary of the Loire, and the Dordogne. The soil is,

Pyat

in general, thin and poor; but its volcanic character fosters vegetation, especially in the valley of Limagne. Agriculture and cattle breeding are the chief occupations. The climate is uncertain, and severe in the mountains. The principal minerals are coal and lead. Hot and cold mineral springs are abundant, among the most frequented being those of Mont Dore, Châteauneuf, St. Nectaire, Royat, Châteldon, etc.

Puymaigre, Théodore Joseph Boudet, a French poet and miscellaneous writer; born in Metz, in 1816. Among his works are: "Jeanne D'Arc," a dramatic poem (1843); "Dante Alighieri" (1845); "Lost Hours," a collection of poems (1866); "The Prediction," in verse (1870); "The Literary Court of Don Juan II. of Castile" (1894); etc.

Puységur, Armand, Marie Jacques, a French soldier and writer; born in Paris in 1751. He entered the artillery service and distinguished himself, afterward also espousing the cause of the Revolution. His chief fame, however, rests on the fact of his having been a disciple of the famous Mesmer. His chief writings are: "Memoirs Touching the History and Establishment of Animal Magnetism" (1784); "Animal Magnetism, Considered in its Relations with Various Branches of General Physics" (1804-1807); "Truths Travel; Sooner or Later They Arrive" (1814). He also wrote some plays, among them "The Day of Dupes" (1789) and "The Benevolent Judge" (1799). He died in Buzancy in 1825.

Puzynin, Gabrielle Gunther, a Polish woman of letters; born in Lithuania, about 1820. She wrote poetry and novels remarkable for moral tendencies and elegant simplicity of style. Among them are: "In the Name of God" (1843); "Further in the World" (1845); "Lithuanian Children" (1847); "Collections of Poems Old and New" (1859); etc.

Pyæmia, or **Pyemia**, a diseased condition in which the blood is poisoned by pus or by some of its constituents; blood poisoning; septicæmia.

Pycnogonum, a genus of Arachnida, the sea spiders. Some species are parasitic upon fishes and other marine animals, but the common species, *P. littorale*, is free when adult, and does not appear to be parasitic during any period of its existence. *P. Balænarum* attaches itself parasitically to the whale.

Pyat, Félix, a French dramatist and politician; born in Vierzon, France, Oct. 4, 1810. An extreme radical agitator, his activity and personal hazard extending from the revolution of 1848 to the Commune of 1871, his part in the latter insurrection of 1871, his part in the latter obliged him to fly the country, and in 1873

he was sentenced to death by the Council of War. During his exile he wrote many inflammatory political pamphlets. His plays also are of political and social tendencies; they are vigorous, and while somewhat sensational, show real originality. Among them are: "A Revolution of Other times; or, The Romans at Home"; "The Brigand and the Philosopher"; "Ango"; "Arabella," a drama ((1838); "Cedric the Norwegian"; "Diogenes" (1846); "The Rag-Picker of Paris," a tragedy (1849); "Tiberius"; etc. He died in St. Gratien, Aug. 4, 1889.

Pycnogonida, Pycnogonata, or Pycnogonidæ, an aberrant family or tribe of Arachnida, consisting of marine animals, having the abdomen rudimentary, and four pairs of legs enormously long and many-jointed (Huxley). Balfour considers the family of doubtful affinities. Some believe them Crustaceans. Parasitic or independently among stone and sea-weeds on sea-beaches, or among rocks, corals, etc., in deep water. Called also Podosomata and Pantopoda.

Pye, Henry James, an English poet; born in London, July 10, 1745. He was educated at Oxford. He held a commission in the Berkshire militia, in 1748 was elected member for that county, in 1790 succeeded Warton as poet laureate, and in 1792 was appointed a London police magistrate. The works of "poetical Pye," who, as Byron remarked, was "eminently respectable in everything but his poetry," are nearly 20 in number, and include "Alfred; an Epic" (1801), with numerous birthday and new-year odes. He died in Pinner, near Harrow, Aug. 13, 1813.

Pye, John, an English engraver; born in 1782. Early in the 19th century he gained a reputation for his engravings of Turner's landscapes, a number of which he executed, beginning with "Pope's Villa" in 1811. He also engraved works by Claude, Michael Angelo, Gaspar Poussin, Landseer, etc. He passed much of his life in Paris, and was elected a corresponding member of the French Institute. He died in 1874.

Pygmalion, in Greek mythology, grandson of Agenor, King of Cyprus. He fell in love with an ivory statue of a young maiden he himself had made, and prayed to Aphrodite to give it life. His prayer was granted, on which he married the maiden, who bore him Paphos.

Pygmy, or Pigmy, in classical mythology, one of a fabulous nation of dwarfs dwelling somewhere near the shores of the ocean, and maintaining perpetual wars with the cranes. Ctesias represented a nation of them as inhabiting India. Other ancient writers believed them to inhabit the Indian islands; Aristotle places them in Ethiopia, Pliny in Transgangetic India. Also, a very

short or dwarfish person; a dwarf; anything very little. In zoölogy, the chimpanzee.

Pygmy Hog, a small pig found in the Nepal and Sikim Terai, probably extending into Assam and Bhotan; length, including tail (about an inch long), 27 inches; height, 10 inches; weight, from 7 to 10 pounds. Blackish-brown, slightly and irregularly shaded with sordid amber; nude skin, dirty flesh color; hoofs, glossy brown. There is no mane, and the female has but six mammae. It is rare, and only found in the recesses of forests. The full-grown males live constantly with the herd, from 5 to 20 individuals, and defend the females and young from harm. They eat roots, bulbs, birds' eggs, insects, and reptiles. The female produces from three to four at a birth.

Pylades, in Greek mythology, son of Strophius, King of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

Pylæ Ciliciæ. See CILICIA.

Pyle, Howard, an American illustrator and author; born in Wilmington, Del., March 5, 1853. He was an illustrator for periodicals, and became popular also as a writer, chiefly of juvenile literature. His works include: "Within the Capes" (1885), a novel; "Pepper and Salt" (1887); "Otto of the Silver Hand" (1888); "Buccaneers and Marooners of America" (1891); "Jack Ballister's Fortunes"; "The Garden Behind the Moon" (1895); etc.

Pylons, in Egyptian architecture, the name given to towers or masses of masonry, somewhat resembling truncated pyramids, placed one on each side at the entrance of temples, and having a very imposing appearance. Behind them in the larger temples there was often a large open court, and in front there might be an avenue with sphinxes on either side. An entrance of which these pylons form part is sometimes called a propylon.

Pylorus, the small and contracted end of the stomach leading into the small intestines.

Pym, John, an English statesman and leader of the popular party during the reigns of James I. and Charles I.; born in Somersetshire, England, in 1584. He studied at Oxford and became famous as a lawyer. He entered Parliament in 1614, and during the reign of James he attained great influence by his opposition to the arbitrary measures of the king. He sat for Tavistock in all the Parliaments of Charles' reign. In 1626 he took part in the impeachment of Buckingham and was imprisoned.

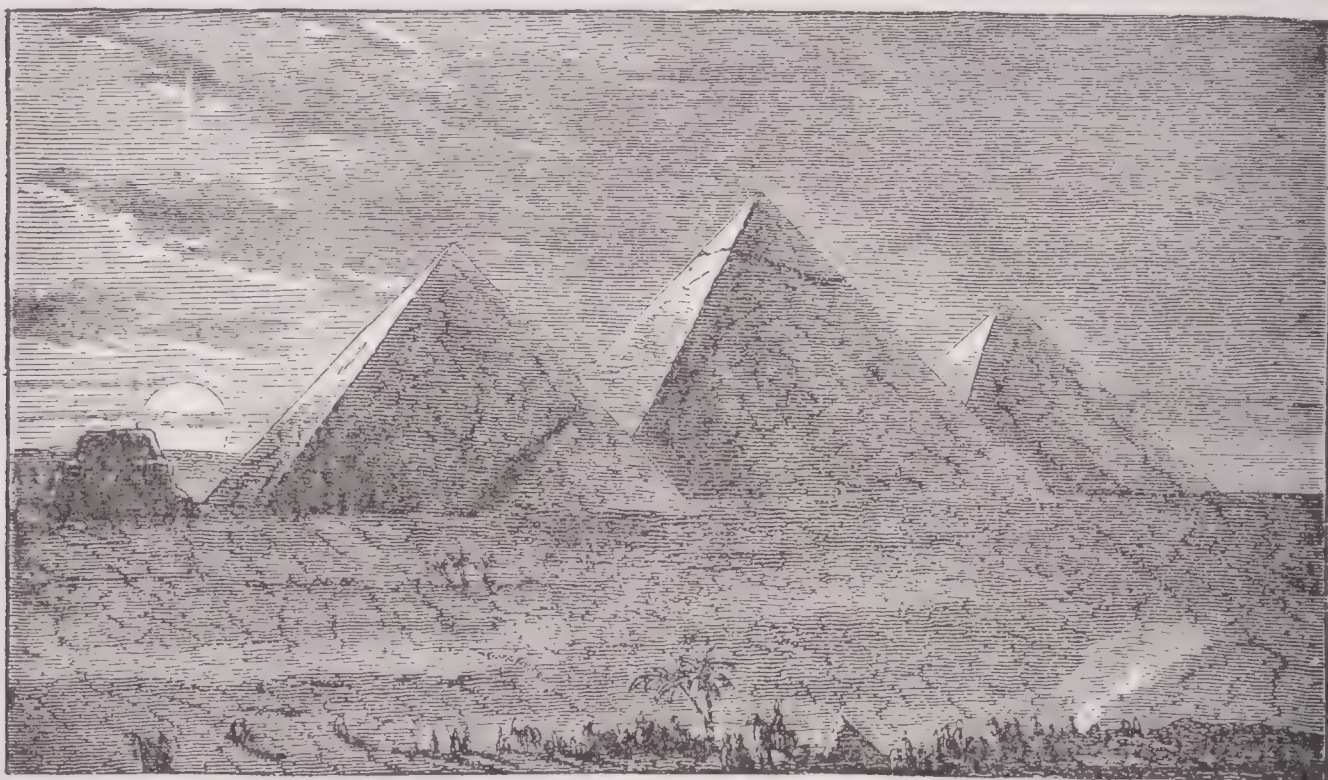
Pynchon

In the Short Parliament of 1640 Pym and Hampden were exceedingly active as leaders of the popular party, and in 1641 Pym was offered the chancellorship of the exchequer. He impeached Strafford, and at his trial appeared as accuser. He was the main author of the Grand Remonstrance, the final appeal presented in 1641, and one of the five members to arrest whom the king went to the House of Commons in January, 1642. When civil war became inevitable Pym was appointed one of the committee of safety, and while he lived was active in resisting the negotiations of any peace with the king which did not secure the liberties of the subject and the supremacy of Parliament. It was mainly his financial skill that enabled the parliamentary army to keep the field.

Pyramid

the employ of a merchant; but devoted his leisure to writing poetry and plays, most of them translated or imitated from the French. Among them are: "Lansus and Lydia," a tragedy (1777); "Beverly," a drama (1781); "The Widow of Malabar," a tragedy (1786); "Stephen, the First Christian Martyr" (1790); "Jephtha," a tragedy (1794); "Iphigenia," a tragedy (1801). He also published various collections of poems. He died in 1805.

Pypin, Alexander Nikolajevich, a Russian historian; born in Saratov, in 1833. He wrote: "Sketch of the Literary History of the Ancient Russian Tales and Wonder-Stories" (1859); "History of the Slavic Literatures" (1865); "Characteristics of Literary Opinion, 1820-1850," (1874);



THE PYRAMIDS.

In November, 1643, he was made lieutenant-general of ordnance, and in the following month he died, and was buried in Westminster Abbey.

Pynchon, William, an American colonist; born in Springfield, England, about 1590. He emigrated to New England with Winthrop, and founded the town of Springfield, Mass. In 1650 he published "The Meritorious Price of Our Redemption," opposing the Calvinistic view of atonement. The book was denounced as heretical, and the author was compelled to return to England to avoid persecution. His other works are: "The Jewes Synagogue" (1652); "How the First Sabbath was Ordained" (1654). He died in Wraybury, England, Oct. 29, 1662.

Pypers, Peter, a Dutch poet and dramatic writer; born in Amersfoort, in 1749. To escape entering the Church as his family wished, he fled to Amsterdam and entered

"History of Russian Ethnography" (1890-1892).

Pyramid, in Egyptian antiquities, a solid structure substantially invariable in form, viz., a simple mass resting on a square or sometimes approximately square base, with the sides facing with slight deviations toward the four principal winds, and tapering off gradually toward the top to a point or to a flat surface, as a substitute for an apex. The proportion of the base to the height is not always the same, nor is the angle of inclination uniform. The pyramids were constructed in platforms, and then revêted or coated with blocks or slabs of granite, as may still be observed in incomplete pyramids. Recently the theory has been maintained that in the case of the largest pyramids, a smaller one was erected as a nucleus, and subsequently enveloped by another layer. The interior of these massive structures contains narrow

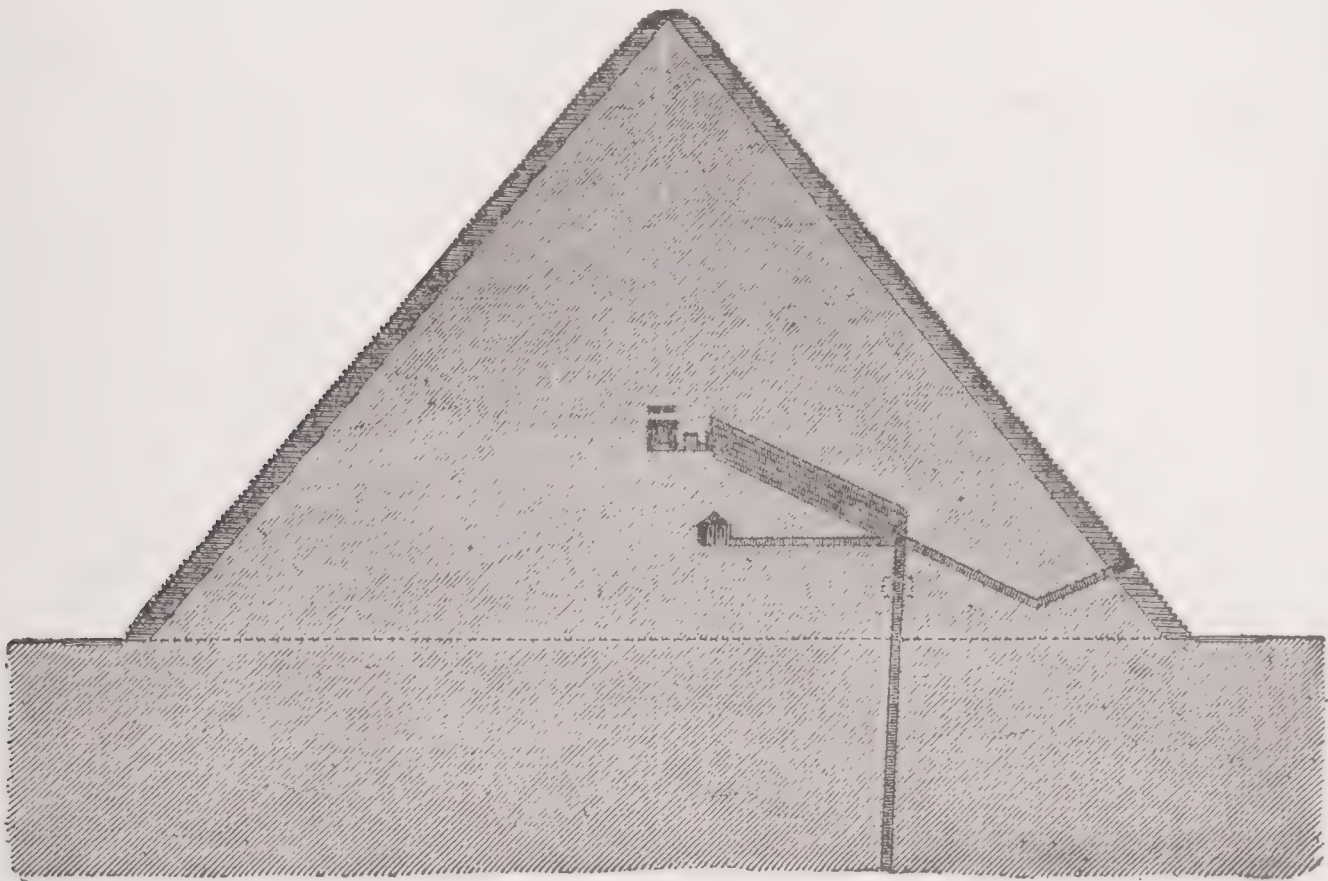
Pyramid

passages, and some totally dark halls or chambers, and probably served as the burial places of the kings who had caused them to be constructed. The entrance to these buildings is raised considerably above the level of the base, and was blocked up by a portcullis of granite, so as to be on ordinary occasions inaccessible. In the pyramid of Cheops, the entrance is raised about 47 feet, 6 inches above the base. The pyramids of Egypt begin immediately S. of Cairo, and continue S. at varying intervals for nearly 70 miles. The largest is that of Cheops, at Ghizeh, standing on a base each side of which was originally 764 feet long, but owing to the removal of the coating is now only 746 feet. Its perpendicular height, ac-

Pyramid

130 feet. One is dedicated to the sun, the other to the moon. A yet larger one is at Cholula; its base is 1,488 feet long, its height 178 feet. All the Mexican pyramids face the cardinal points. Hence, applied to any mass or heap more or less resembling a pyramid in form.

In anatomy, a conical bony eminence in the anterior wall of the tympanum of the ear. Also that portion of the *medulla oblongata* forming the floor of the fourth ventricle of the brain; two conical eminences known as the posterior pyramids, the *corpora pyramidalia*, leading to the *pons Varolii*, being the anterior pyramids. In geometry, a polyhedron bounded by a polygon, having any number of sides, called the base,



SECTION OF THE GREAT PYRAMID.

According to Wilkinson, was originally 480 feet, 9 inches, present height, 460 feet. The principal chamber, the so-called Crowning Hall or King's Chamber, is 34 feet, 3 inches long, and 17 feet, 1 inch wide. Its roof is formed of massive blocks of granite, over which, with a view to support the weight, other blocks are laid, with clear intervals between. According to Herodotus, the erection of this pyramid employed 100,000 men for 20 years.

In Mexican antiquities, the Teocallis, or Houses of the Gods, which have come down from Aztec times, are four-sided pyramids rising by terraces to a considerable height. A group of such erections still exist at Teotihuacan, about 20 miles N. E. of the City of Mexico. There are two large pyramids, with some hundred smaller ones. The base of the largest is 900 feet long, its height 160 feet; the height of the second is

and by triangles meeting in a common point, called the vertex. Pyramids take different names according to the natures of their bases. They may be triangular, quadrangular, etc., according as their bases are triangles, quadrilaterals, pentagons, etc. The base and lateral triangles are called faces; the lines in which the faces meet are called edges; the points in which the edges meet are called vertices of the pyramid. A right pyramid is one whose base is a regular polygon, and in which a perpendicular let fall from the vertex upon the base, passes through its center. The regular pyramid is a pyramid bounded by four equilateral triangles. It is called the tetrahedron. In botany, the American calumba or Indian lettuce, *Frasera carolinensis*. Pyramid pool: A game played with 15 red balls and one white ball, the former being placed in a triangular form at a spot on the top of the

Pyramus

table. The object of the players, who play in turn with the white ball, is to pocket as many red balls as possible.

Pyramus, in classical mythology, a Babylonian youth, who became enamoured of Thisbe, a beautiful virgin. Their affection was mutual, and the lovers, whom their parents forbade to marry, regularly interchanged sentiments through the chink of a wall which separated their houses. They both agreed to elude the vigilance of their friends, and to meet at the tomb of Ninus, under a white mulberry tree, outside the walls of Babylon. Thisbe came first to the appointed place; but the sudden arrival of a lioness frightened her away, and, as she fled, she dropped her veil, which the lioness found and covered with blood. Pyramus soon arrived, and finding Thisbe's veil bloody, concluded that she had been torn to pieces by wild beast; and stabbed himself. Thisbe, when her fears had vanished, returned from the cave, and at the sight of the dying Pyramus, fell on the sword still reeking with his blood. The tree, as the poets mention, was stained with the blood of the lovers, and ever afterward bore fruit, but of the color of blood.

Pyrénées, an extensive mountain range in the S. of Europe, dividing France from Spain, and extending almost in a straight line from St. Sebastian, on the Bay of Biscay, to Cape Creux, on the Mediterranean. Length 270 miles, with a breadth from 50 to 100 miles. From them proceed, under various names, inferior ramifications of mountains along the French territory on the N., and that of Spain on the S. The acclivity of the Pyrénées on the side of Spain, is often extremely steep, presenting a continued succession of rugged chasms, abrupt precipices, and huge masses of naked rock; on that of France, the ascent is generally gradual, and the mountains are more accessible, and of more pleasant aspect; they have a mean altitude of nearly 8,000 feet, which is also the limit of the snow line. The principal summits are Mount Perdu, which has an elevation of 10,994 feet; the Vignemale, 10,820 feet; and the Peak of Nethou, 11,168 feet. They contain glaciers, as in the Alps; but these masses of permanent ice are much less extensive. In an extent of 250 miles, there are necessarily many passes; the total number, including paths for pedestrians, exceeds 50; but the carriage-roads hardly exceed five; and of these, the most frequented are from Jonquera to Perpignan on the E., and from St. Sebastian to St. Jean de Luz on the W., and at some distance inland, from Pampe-luna to St. Jean Pied de Port. The passes in the interior are over very high ground; thus that of Pineda is 8,248 feet above the sea; Gavarnie, 7,654; Lavareze, 7,350; and Tourmalet, 7,143. The principal rivers ris-

Pyrénées-Orientales

ing in the Pyrénées are the Adour, Garonne, and Aude, flowing N., and the Slobregat, and numerous affluents of the Ebro, flowing toward the S.

Pyrénées, Basses, a department in the S. W. corner of France, between the Landes and Spain, and having the Bay of Biscay on the W.; area, 2,943 square miles; pop. (1906) 425,817. It is divided into the arrondissements of Pau, Oloron, Orthez, Bayonne, and Mauléon. Chief town, Pau. The department occupies the N. slopes of the Western Pyrénées (2,000–9,800 feet), offshoots from which divide the department into a number of valleys, traversed by mountain streams (*gaves*). The chief are the Gave d'Oloron, and Gave de Pau, and other tributaries of the Adour. The Bidassoa, with the Isle of Pheasants, where the treaty of 1659 was signed, forms the dividing line between France and Spain for a short distance. The high valleys and slopes are generally fertile, and well adapted for the growth of the vine, chestnut, and other fruits. Agriculture is the principal industry; large herds of cattle and sheep are fed on the extensive pastures, and many swine in the wide forests. Of the numerous mineral springs the most important are those of Biarritz, Eaux-Bonnes, and Eaux-Chaudes. The W. half of the department is the home of the BASQUES (*q. v.*).

Pyrénées, Hautes, a department of France lying E. of Basses-Pyrénées; a part of the old province of Gascony; area, 1,749 square miles; pop. (1906) 209,397. As its name implies, it contains the loftiest summits of the PYRÉNÉES (*q. v.*), and is divided into the three arrondissements of Tarbes, Argelès, and Bagnères de Bigorre; chief town, Tarbes. The principal rivers are the Adour and the Gave de Pau. The climate is generally mild in the plains and sheltered valleys. The well-cultivated and artificially watered lowlands yield good crops of cereals, leguminous plants, and fruits of every kind, including the grape. Cattle, sheep, and swine are reared. Marble and slate are quarried. In this department are the springs of St. Sauveur, Bagnères de Bigorre, Bargèges, and Cauterets.

Pyrénées-Orientales, a S. department of France; bounded on the E. by the Mediterranean and on the S. by the Pyrénées; area, 1,592 square miles; pop. (1906) 213,171. It is divided into the three arrondissements of Perpignan, Prades, and Céret. The chief town is Perpignan. Like the other Pyrenean departments, this one embraces a series of parallel valleys formed by spurs from the Pyrénées. A plain occupies all the N. and E. of the department. Agriculture is extensively prosecuted, but wines constitute the wealth of the district, and include the red wines of Roussillon, the white muscatel of Rivesaltes, and others. This department

Pyrénees

takes the front rank as a producer of iron ore; granite, slate, and limestone are quarried. There are mineral springs at Amélie-des-Bains, and elsewhere.

Pyrénees, Peace of the, a treaty concluded between France and Spain by Cardinal Mazarin and De Haro, on the Ile des Faisans, in the river Bidassoa, on the borders of the two countries, Nov. 7, 1659, terminating a war which has lasted for 24 years. By this treaty Spain ceded to France Roussillon, with the fortress of Perpignan, etc., so that the Pyrénees have since formed the boundary of the two kingdoms; and in the Netherlands, Artois, and part of Flanders, Hainault, and Luxemburg, with a number of fortified towns.

Pyrethrum, in botany, a genus of *Chrysanthemæ*, reduced by Sir Joseph Hooker to a sub-genus of *Matricaria*, having the receptacle almost flat. *Matricaria inodora*, formerly *P. inodorum*; another *M. parthenium*, formerly *P. parthenium*, is an escape or a denizen. See FEVERFEW.

Pyrheliometer, an instrument invented by Pouillet for measuring the amount of heat radiated from the sun. It consists of a shallow cylinder of very thin copper or silver on a stem, provided with means of attachment to a stationary object, and carrying a disk on which the shadow of the cylinder may be received, so that it may be pointed directly toward the sun. The cylinder is blackened in order to absorb all the heat possible, and is filled with water in which the bulb of a thermometer is placed. The instrument, at the atmospheric temperature, is first shaded from the sun, but exposed to the sky for five minutes, and, the difference of temperature noted, the shading screen is then withdrawn, and the cylinder exposed to the direct action of the sun's rays for five minutes, and the temperature noted, when it is again shaded for five minutes, and the fall of the thermometer observed.

Pyrites, an isometric mineral occurring frequently crystallized, also massive, in mammillary forms with fibrous structure, and stalactitic with crystalline surface. Hardness, 6-6.5; sp. gr. 4.83-5.2; luster, metallic, splendid; color, pale brass-yellow; streak, greenish-black; opaque; fracture conchoidal uneven; brittle; strikes fire when struck with a hammer. Composition: Sulphur, 53.3; iron, 46.7 = 100, which yields the formula FeS_2 . Other elements sometimes replace a part of the iron, but only in small quantity. Dana divides this species into: (1) Ordinary; (a) distinct crystals; (b) nodular or concretionary; (c) stalactitic; (d) amorphous. (2) Niccoliferous; (3) cobaltiferous; (4) copperiferous; (5) stanniferous; (6) auriferous; (7) argeniferous; (8) thalliferous. Occurs abundant-

Pyrolith

ly distributed in rocks of all ages, either as crystals, crystal-grains, or nodules, also in metalliferous veins.

Pyro=electricity, a name given to electricity produced by heat, as when tourmaline becomes electric by being heated between 10° and 100° C.

Pyrogallic Acid, in chemistry, $\text{C}_6\text{H}_6\text{O}_3 = \text{C}_6\text{H}_3(\text{OH})_3$, pyrogallol, an acid, discovered by Scheele, who considered it sublimed gallic acid, and prepared it by heating gallic acid in a stream of carbonic anhydride. It crystallizes in long flattened prisms, soluble in water, slightly soluble in alcohol and ether, melts at 115° , and boils at 210° . Its solutions reduce the salts of gold, silver, and mercury, and give a deep blue color with ferrous salts. It dissolves in potash or soda, forming a solution which rapidly absorbs oxygen from the air and turns black. Extensively used in photography as a reducing agent. Its salts, the pyrogallates, are little known.

Pyrograph, an apparatus for engraving on wood or leather by means of a red-hot metallic point. The most improved form of this apparatus consists of a tube six inches in length and about half an inch in diameter, provided at its lower extremity with a screw-cap and a small support. At the other end there is a bent rod, to which the drawing point is fixed by means of a screw. For the formation of the combustible gas and the heating of the rod, sulphuric ether is employed. This liquid, like benzine, is quite inflammable, and care must be taken not to pour it out near a flame. In a closed receptacle it is safe enough. After the flame has been regulated it is possible to work for two consecutive hours at an expense of a cent for ether. The vapors disengage themselves constantly and feed the small flame, which is barely perceptible. The heat is always uniform, and even on leather a sure and sharp execution of the design is possible. The finest and most delicate lines can be drawn, and there is no danger of burning holes in the material. As the left hand is free, the object to be ornamented can be turned in any position while the work is in progress.

Pyroligneous Acid, impure acetic acid, obtained by the destructive distillation of wood.

Pyrolith, or Liquid Marble, a composite, plastic material that so closely resembles marble that no one can detect any difference. It fulfils the requirements of the sculptor as to durability and hardness and forms an imperishable material, easy to work and capable of receiving every delicate line and curve of the clay model. It was discovered by George Julian Zolnay, an American sculptor, and is the result of years of hard work. Marble is admittedly the

Pyrolusite

best material the world affords for preserving the creative imagination of the sculptor, and next to that bronze is considered the most desirable and durable. But both of these materials require great labor and expense and the cost of the finished work is large in proportion. When the artist has made the clay model, and the plaster cast, which is the exact mold of the original, the liquid marble is poured into the mold. It fills every crevice and takes to itself, in hardening, absolute fidelity to the original. In again solidifying, the new substance retakes and retains that peculiar transparency which makes marble the highest medium for a representation of the human form. This is a process of hours; bronze and marble require days. With the latter materials, the making of duplicates is as costly as the making of the first copy of the original; by this new method duplicates may be made rapidly and in as large a number as may be desired, at a low cost as compared with the other methods.

Pyrolusite, one of the most important of the ores of manganese. Crystallization, orthorhombic; frequently occurring massive to earthy, soiling the fingers. Hardness, 2-2.5; sp. gr. 4.82; luster, metallic; color, iron-black to steel-gray; streak, black; opaque; brittle. Composition: Manganese, 63.3; oxygen, 36.7 = 100; yielding the formula, MnO_2 . Extensively worked in many localities. Used in preparing oxygen gas, with which it parts at a red heat; and also in glass making.

Pyrometer, a term originally applied to an instrument in the form of a single metallic bar, employed by Muschenbroek about 1730, to indicate temperatures above the boiling point of mercury, 660° F. It is now applied to any instrument used for such purpose. The first which came into extensive use was that of Wedgwood, about 1780; it was devised and used by him for testing the heat of his pottery and porcelain kilns. No fewer than 11 different modes have been proposed or actually employed for measuring high temperatures: (1) By contraction of clay on exposure to heat, as in Wedgwood's; (2) by expansion of bars of different metals; (3) by change of pressure in confined gases; (4) by the amount of heat imparted to a cold mass; (5) by the fusing-point of solids; (6) by conduction and radiation of heat, depending upon observations with thermometers of moderate range at relative distances (see PYROSCOPE); (7) by color, as red and white heat; (8) by change in velocity of sounds depending on the change of pitch in musical notes; (9) by resolution of chemical compounds; (10) by generation of electricity, as in Becquerel's thermo-electric pyrometer; (11) by change in resistance to elec-

Pyrosis

tricity, as in Siemens' pyrometer, which depends on the increased resistance offered by an iron or platinum wire to the passage of electricity. Of all these, the third (M. Lamy's), depending on the measurement of the tension of carbonic acid gas developed from marble when heated, and the last, are considered the best.

Tremeschini's pyrometer is founded on the expansion of a thin plate of platinum, heated by a mass of metal previously raised to the temperature of the medium. The Trampler pyrometer is based on the difference in the coefficients of dilatation for iron and graphite; the Gauntlet pyrometer on the difference of those of iron and fire-clay. The Ducomet pyrometer consists of a series of rings made of alloys which have slightly different melting points. In pyrometers on the Watertype principle, the temperature is determined by noting the amount of heat communicated to a current of water of known temperature which is kept circulating in the medium to be observed.

Pyrope, in mineralogy, one of the garnet group, in which magnesia predominates among the other protoxide bases. It also contains chromium. Color, a deep-red; transparent. Found associated with serpentines, and in streams in Bohemia. Much used in jewelry.

Pyrophone, an instrument invented by Kastner, the sounds of which are produced by jets of gas burning under glass tubes. It has three manuals.

Pyrophorus, in chemistry, a term applied to any substance capable of taking fire spontaneously, or on a slight elevation of temperature. The pyrophorus of Homberg is a mixture of alum and sugar carefully carbonized in an open pan, and then heated to redness in a flask free from air. It ignites on exposure to the air. In entomology, a genus of *Elateridæ*, emitting light at will from two rounded spots on the prothorax. About 90 species are known, all from America. They fly by night, and, in structure, differ widely from the fireflies of the Eastern Hemisphere. The type of the genus is *P. noctilucus*, the West Indian fire-fly. See FIREFLY.

Pyroscope, an instrument, invented by Leslie, to measure the intensity of heat radiating from a hot body or the frigorific influence of a cold body. The instrument is like a differential thermometer, one ball being covered with thick silver-leaf; the other ball is naked and forms the pyroscope.

Pyrosis, water-brash; a form of eructation, with pain in the epigastric region, from which water, either tasteless or sour and acrid, rises into the mouth.

Pyrosoma

Pyrosoma, the sole genus of *Pyrosomidae*, a family of Tunicata, with three species. Animals, compound, free, and pelagic, ranging from two to 14 inches in length, and from half an inch to three inches in circumference. They are brilliantly phosphorescent, and Péron compared them to small incandescent cylinders of iron.

Pyrotechny, in the proper sense, the science which teaches the management and application of fires. In the more popular sense, however, the word chiefly refers to the art of making fireworks. The principal ingredients used are purified saltpeter, sulphur, and charcoal. Gunpowder is also used in the composition of fireworks. For this purpose it is first ground, or, as it is technically termed "mealed." In different fireworks the proportions of the materials differ very much; and great care and precaution are necessary in mixing and working them into a proper state for use. Camphor, alcohol, antimony, and other substances are employed when it is required to produce colored stars. When gold or silver rain is required, brass dust, steel dust, sawdust, etc., are used. Steel filings and cast iron borings contain carbon, and give a brilliant fire with wavy radiations. Copper filings give a greenish tint, zinc a fine blue, sulphide of antimony a greenish-blue, with much smoke. Amber affords a yellow fire with colophony and common salt; but the last must be very dry. All the salts of copper tinge the flames green; those of strontian, red; those of caryta, a peculiar green. Lycopodium burns with a magnificent rose-colored flame. It is principally used in theaters to represent lightning. All fireworks are divided into three classes — those which are let off on the ground (as jets of fire and revolving wheels), those which are shot up into the air (as sky-rockets and Roman candles), and lastly, those which act on or under water.

Pyroxene, a name used for a group of minerals of very variable composition and origin, but all of which are referable (like the analogous group of amphiboles) to the same chemical type, under the general formula $ROSiO_2$, where R may represent lime, magnesia, the protoxides of iron and manganese, and sometimes soda, potash, and oxide of zinc. Two or more of these bases are always present, the most frequent being lime, magnesia, and protoxide of iron, lime being always present and in a large percentage. Sometimes these bases are replaced by sesquioxides, but always sparingly. The result of these isomorphous replacements is shown in the diversity of habit, color, and form of its numerous varieties. Crystallization monoclinic. Hardness, 5–6; sp. gr. 3.23–3.5; luster, vit-

Pyrrho

reous to resinous; color; shades of green and white to black; transparent to opaque; fracture, conchoidal. The two most important divisions are Non-aluminous and Aluminous. Dana subdivides these into:

NON-ALUMINOUS: 1. Lime-magnesia pyroxene; (1) malacolite; (2) alalite; (3) traversellite; (4) muscite; (5) white coccolite. 2. Lime-magnesia-iron pyroxene; (1) sahlite; (2) baikalite; (3) protheite; (4) funkite; (5) diallage. 3. Iron-lime pyroxene; hedenbergite. 4. Lime-magnesia-manganese pyroxene; schefferite of Michaelson. 5. Lime-iron-manganese pyroxene. 6. Lime-iron-manganese-zinc pyroxene, jeffersonite.

ALUMINOUS: 7. Aluminous lime-magnesia pyroxene, leucaugite. 8. Aluminous lime-magnesia-iron pyroxene; (1) fassaite; (2) augite; (3) aluminous diallage. 9. Aluminous iron-lime pyroxene; (1) hudsonite; (2) polykite. Appendix, 10. Asbestos, 11. Breislakite, 12. Lavroffite.

This mineral is most extensively distributed in metamorphic rocks, which contain the lighter colored, and also in eruptive rocks, which contain the greenish-black and black varieties. The variety characterizing serpentines and gabbros is diallage.

Pyroxylic Spirit, Wood Spirit, or Wood Naphtha, a mixture of acetone, methyl-alcohol, acetate of methyl, etc., obtained by the destructive distillation of wood in the manufacture of PYROLIGNEOUS ACID (*q. v.*). Many of its properties are the same as those of common alcohol. It is of nearly equal value to alcohol in making varnishes, as it dissolves the resins, oils, and other similar substances. It has a peculiar naphtha-like odor, which is inseparable from it, and prevents its use as a potable spirit at present; but it is asserted that some makers produce it almost odorless, and that it sometimes take the place of common alcohol in the manufacture of cheap perfumes. It is used in making METHYLATED SPIRIT (*q. v.*).

Pyrrhic, a species of warlike dance, which is said to have been invented by Pyrrhus to grace the funeral of his father Achilles. It consisted chiefly in such an adroit and nimble turning of the body as represented an attempt to avoid the strokes of an enemy in battle, and the motions necessary to perform it were looked on as a kind of training for actual warfare. This dance is supposed to be described by Homer as engraved on the shield of Achilles. It was danced by boys in armor, accompanied by the lute or lyre. Also a metrical foot consisting of two short syllables.

Pyrrho, a celebrated philosopher of Elis, and founder of the sect called Skeptics, or Pyrrhonists, flourished about 340 B. C. He was originally a painter, but afterward became a disciple of Anaxarchus, whom he accompanied to India in the train of Alexander the Great, and while there obtained a knowledge of the doctrines of the Brahmins, Gymnosophistes, Magi, and other eastern sages. On the return of Pyrrho to Greece, the inhabitants of Elea made him

Pyrrhus

their high priest, and the Athenians gave him the rights of citizenship. Pyrrho's skepticism was by no means of the thorough-going kind that is usually associated with his name, which is synonymous with absolute and unlimited infidelity. He certainly disbelieved in the possibility of acquiring a scientific knowledge of things; but, like Kant, he appears to have tenaciously maintained the reality of virtue, and the obligations of morality. He died 288 B. C.

Pyrrhus, King of Epirus, being obliged, on the murder of his father, to seek safety by flight, found a home, parent, and tutor



PYRRHUS.

in Glaucus, King of Illyria, where he remained for several years, till old enough to maintain his own right, and ascended his father's throne. 295 B. C. Having attempted to possess himself of Macedonia, he was defeated in a great battle, and compelled to relinquish his ambitious design. In 281 B. C., he made war on the Romans, having been called to the assistance of the Samnites, and, in a desperate battle fought on the banks of the Syris, in Calabria, totally defeated the Roman army; yet, so dearly was this glory bought, that Pyrrhus exclaimed "Another such victory will ruin me." After several signal advantages, the Romans at length triumphed, and Pyrrhus, sustaining many disasters, returned to Greece, and, in a subsequent war with the Argives, was killed, by a tile thrown on his head from the roof of a house, as he entered Argos, 273 B. C. Pyrrhus was one of the most illustrious generals of the age in which he lived. The Romans entertained the highest opinion of his military skill, and from him, in fact, they learned much of the art of war. He was fond of glory, and personally brave, even to rashness; but his faults of ambition were counterbalanced by acts of courtesy and benevolence.

Pyrrhus. See NEOPTOLEMUS.

Pythagoras

Pyrus, a genus of Pomaceæ (Lindley); of Pomeæ, a tribe of Rosaceæ (Sir J. Hooker). Fruit two to five celled, with cartilaginous walls. North temperate zone. Known species about 40. Five most familiar are: *Pyrus communis*, the wild pear, *P. malus*, the wild or crab apple, *P. (Sorbus) torminalis*, the wild service, *P. (Sorbus) aria*, the white beam-tree, and *P. (Sorbus) aucuparia*, the mountain ash or rowan tree. One, *P. (Mespilus) germanica*, the medlar, is an escape. *P. baccata*, *P. kumaoni*, *P. lanata*, *P. pashia*, and *P. vestita*, Indian species, have more or less edible fruits.

Pythagoras, the celebrated Greek philosopher, was born in Samos, probably about 580-570 B. C. He was the son of Mnesarchus, and, perhaps, a disciple of Pherecydes. He is said to have traveled extensively, especially in Egypt, and to have been initiated in the most ancient Greek mysteries. He attached great importance to mathematical studies, and is believed to have made several important discoveries in geometry, music, and astronomy. Aversion to the



PYTHAGORAS.

tyranny of Polycrates, in Samos, is said to have been the cause of his quitting that island after his return from the East; and he ultimately settled, between 540-530 B. C. at Crotona, one of the Greek cities of Southern Italy. There he set himself to carry out the purpose of instituting a society through which he might, to some extent, give embodiment and practical shape to his ideas. Pythagoras himself was the chief, or general, of the order. Similar societies were founded in other cities of Italy, and through all of them Pythagoras exerted a considerable influence on political affairs, and especially in opposition to democratic and revolutionary movements. His teachings relating to these subjects became at length the occasion of a popular rising against the Pythagoreans at Crotona, 504 B. C.—the house in which they were assembled was burned, many perished and the rest were exiled. Similar tumults with similar results, took place in other cities and Pythagoras himself is believed to have died soon after, at Metapontum. Among the doctrines of Pythagoras are the following: that numbers are the principles of all things; that the universe is a harmonious whole (kosmos), the heavenly bodies by their motion causing sounds (music of the

spheres); that the soul is immortal, and passes successively into many bodies (metempsychosis); and that the highest aim and blessedness of man is likeness to the Deity. He left no written account of his doctrines; they were first committed to writing by Philolaus. Pythagoras is said to have been the first who took the title of philosopher, and the first who applied the term kosmos to the universe. He shares with Thales and Xenophanes the high distinction of starting the problem of physical science. He died in Metapontum, Magna Græcia, about 500 B. C.

Pythagorean Theorem, the 47th proposition of the first book of Euclid's "Elements," which shows that in any right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

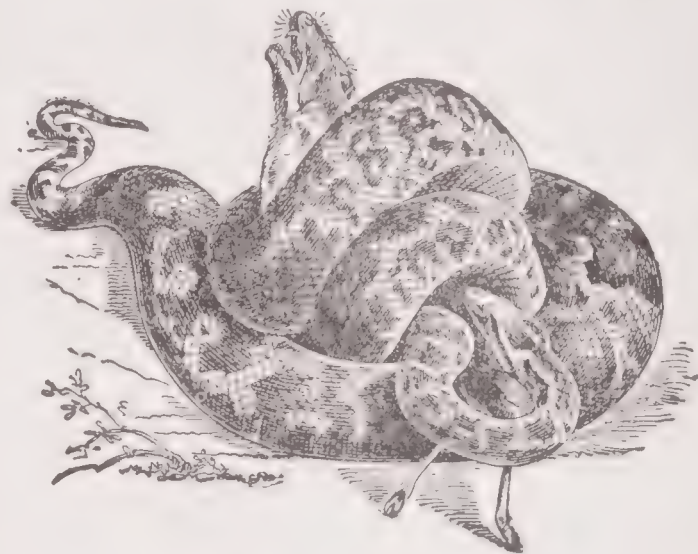
Pytheas, a famous navigator of the Greek colony of Massilia, now Marseilles, supposed to have lived about the time of Alexander the Great (say 330 B. C.). He is reputed to have sailed along the W coast of Europe, entered the English Channel, and traveled some distance in Britain, then, continuing his journey N. to have arrived at Thule (supposed to be Iceland). In a second voyage he entered the Baltic, where he proceeded as far as a river which he called Tanais, and on the banks of which amber was found. We only know of him through Strabo, Pliny, and others.

Pythian Games, one of the four great national festivals of the Greeks, held in the Crissæan plain, near Delphi (anciently called Pytho), said to have been instituted by Apollo after vanquishing the snaky monster, Python, and celebrated in his honor every four years. Originally the contests were restricted to singing, with the accompaniment of cithern playing; but flute playing, athletic contests, horse racing, contests in poetry and art were afterward introduced, and long continued a distinguished feature of these games, which are believed to have lasted down to nearly the end of the 4th century A. D. The prize was a laurel wreath and the symbolic palm branch. Several of Pindar's extant odes relate to those who were victors in the Pythian games.

Pythias, Knights of, a benevolent and friendly order, founded during the Civil War, and now flourishing in various parts of the world. The order is very strong in the United States. Justus H. Rathbone founded Washington Lodge No. 1 in Washington, in December, 1864. A Grand Lodge of the District of Columbia was organized in 1864, with Joseph T. K. Plant as grand chancellor. Later the organizers pushed their way beyond the District of Columbia, and began a work that has brought the

whole continent within the Pythian field. On Jan. 1, 1910, the total membership of the order was 706,922. Membership of the Uniform Rank (military branch), 27,681. Membership of the Endowment Rank (life insurance branch), 73,585, representing an endowment of \$110,233,458. Total paid beneficiaries to July 1, 1900, \$14,865,883. The office of the Supreme Keeper of Records and Seal is at Minneapolis, Minn.

Python, in Greek mythology, a celebrated serpent which destroyed the people and cattle about Delphi, and was slain by Apollo. In zoölogy, rock snake; the typical



PYTHON: MOLURUS.

genus of Pythonidæ. Anterior half of upper side of head covered with symmetrical shields, the under with scales; nostrils between two shields unequal in size. They have a double row of scutes under the tail, and teeth in the intermaxillary bone. There are two species from India, *P. molurus* and *P. reticulatus*, and three from Africa, *P. sebæ* (which has incubated in the Zoölogical Gardens, Regent's Park), *P. regius*, and *P. natalensis*.

Pythoess, the priestess of the temple of Apollo at Delphi, who delivered the oracles of the god; hence, applied to any woman who pretended to foretell coming events.

Pyx, the sacred vessel used in the Catholic Church to contain the consecrated eucharistic elements which are preserved after consecration, whether for the communion of the sick or for the adoration of the faithful in the churches. It is sometimes called ciborium—a name, however, also given to the BALDACHIN (*q. v.*). The form of the pyx has varied very much at different times. Anciently it was sometimes of the form of a dove, which was hung suspended over the altar. More commonly, however, it was, as its name implies, a simple box, generally of the precious metals, or, at least, of metal plated with gold or silver. At present the pyx is commonly cup-shaped,

Pyx

with a close-fitting cover of the same material. The interior is ordered to be of gold, or at least plated with gold. Like all the other sacred utensils connected with the administration of the eucharist, it must be blessed either by a bishop, or by a priest delegated by a bishop.

Pyx, the box in which sample coins are placed in the English mint. A triennial test by assay for purity is held, and is termed the trial of the pyx. Two pieces are taken from each bag of newly coined money, one for trial in the mint, the other is deposited in the pyx. The Lord Chancellor summons a jury of freemen of the Goldsmiths' Company, who test by weight and assay in comparison with certain standard trial-plates deposited in the Exchequer. The same custom is followed with reference to

Pyxis

American coin. In nautical language, the pyx is the binnacle box in which a compass is suspended.

Pyxidium, in botany, a syncarpous fruit, superior, and with the carpel dry and dehiscent by a transverse suture. Example, *Anagallis*. In zoölogy, a genus of *Vorticellina*. Solitary animalcules, according in structure with the zoöids of the compound genus *Opercularia*. Two species, both from fresh water.

Pyxis, or **Pyxis Nautica** ("the Ship's Compass"), one of the 14 constellations added to the heavens by Lacaille in connection with his work at the Cape of Good Hope. It is surrounded by Vela, Puppis, Hydra, and Antlia. Its brightest star is of the 3.8 magnitude.



q, the 17th letter and the 13th consonant of the English alphabet, a consonant having only one sound, that of k or c. It is always followed by u, and as this combination can be represented by kw (or k when u is silent), q is a superfluous letter. In Latin, as is also the case in English, q was always followed by u. Q did not occur in the Anglo-Saxon alphabet, its sound being represented by cw or cu, as *cwic* = English, quick, *cwén* = English queen, *cweian* = English quail, etc. For qu, in English, the Dutch use kw, the Germans qu, the Swedes and Danes qv. Q is most commonly found as an initial letter; it never ends a word. The name of the letter is said to be from French *queue* = a tail, the form being that of an O with a tail to it.

As an initial, Q represents the Latin *Quintus* in inscriptions or literature; in geometry, etc., it represents the Latin *quod* (= which), as Q. E. D. = *quod erat demonstrandum* = which was to be shown or proved; Q. E. F. = *quod erat faciendum* = which was to be done, abbreviations frequently written at the end of a theorem or problem respectively.

As a symbol, Q was formerly used for 500, and with a dash over it, for 500,000.

Quack Doctors. Medical quackery is a product of all countries and of all ages; it flourishes among civilized and uncivilized communities alike, and was as rampant before the Christian era as it is in our own day. At all times it has found a numerous public ready and willing to be gulled, and this is not only among the illiterate and vulgar, but even specially among the higher and better educated classes. In many cases royalty itself has set the fashion by lending its patronage to notorious charlatans. In more ancient days the loquacity and persistence were verbal; now they are both verbal and literary, as is shown in the deluge of advertisements with which medical quacks flood the world.

Quackery may be taken to include all devices — whether practised by legally qualified medical practitioners or by those who

have had no recognized medical training — which tend to deceive the public by disseminating false ideas of disease, or a belief in imaginary ailments, which vaunt certain medicines or methods of treatment as panaceas or cure-alls, or which attribute to an individual a supernatural or exceptional power of influencing and curing disease. The element of pecuniary gain or of personal vainglory also comes into a definition of quackery, as opposed to the singleness of purpose and devotion to the interests of the patient which are traditionally held to be the guiding principles of the orthodox practitioner of medicine. Perhaps the most amusing description of quacks and their methods has been given by Goldsmith in his "Citizen of the World," and it is as true and as trenchant today as it was then. He says: "Whatever may be the merits of the English in other sciences, they seem peculiarly excellent in the art of healing. There is scarcely a disorder incident to humanity against which they are not possessed with a most infallible antidote. The professors of other arts confess the inevitable intricacies of things, talk with doubt, and decide with hesitation. But doubting is entirely unknown in medicine; the advertising professors here delight in cases of difficulty; be the disorder ever so desperate or radical, you will find numbers in every street, who, by levelling a pill at the part affected, promise a certain cure without loss of time, knowledge of a bedfellow, or hindrance of business.

The methods of quack doctors have been the same from all time, and consist principally in attracting and impressing public attention by extraordinary surroundings and behavior, and in loudly and persistently asseverating the virtues of their nostrums. This is essentially advertising; and while the invention of printing has stimulated many industries, there are few which it has benefited to a greater extent than that of the quack doctor, as it at once opened the way to a much wider public. The enormous modern spread of newspaper reading has further been largely turned by the quack to his own advantage, as it opens up a still wider field for the puffing of his wares. When once public attention has been

caught, the battle is more than half won; patronage, popularity, and success follow almost as a matter of course. Fortunately these are frequently of a very temporary character; but, as quack doctors are essentially a migratory tribe, this drawback troubles them comparatively little. When they return to their old haunts a new crop of dupes is certain to have come up. The success of quacks must be attributed largely to an imperfect knowledge among the general public of what constitutes disease, added to which there is often an implicit faith in the curative power of drugs. There is little popular conception of what is possible or impossible in the way of healing, and thus the most absurd and extravagant statements are received as facts. Their success, however, has a deeper origin—viz., in the most potent of all human passions—the desire to preserve life. The strong desire for life, health, and the relief of pain clouds the judgment and causes the chance of relief from any source to be eagerly grasped at. The popular love of the marvellous and mysterious has also been of great assistance in pushing the fortunes of many quacks.

Quack medicines, as a rule, form no real additions to our means of treating disease. Almost without exception they are formulæ taken from some old or modern pharmacopœia, or the prescription of some well-known physician, christened with a name calculated to strike the popular fancy, and then puffed and advertised into fame. Such remedies are to be found for every real and imaginary ailment of mankind; but the happy hunting ground of the quack is more especially in the regions of chronic, but not fatal, disease, such as the multifarious rheumatic affections, chronic skin affections, asthma, hysteria, hypochondriasis, “nervous disorders,” and a host of others. Persons afflicted with such ailments naturally have alternations of good, bad, and indifferent health, and are often very prone to attribute what is simply natural improvement to the action of the remedy last taken. It is such people who certify so confidently and so gratefully to the curative powers of quack medicines. Cures for cancer, sterility, and consumption, various elixirs of life and youth, and single antidotes efficacious against all poisons must alone have made the fortunes of many thousands of quack doctors. The sad part of the whole matter is that mankind never seems to learn by experience; no new methods of deception are introduced, no real originality or inventive enterprise is ever shown by quacks; they rely on exactly the same old artifices as their predecessors did, and generation after generation are duped by them just as surely.

Quackenbos, George Payn, an American educator; born in New York city, Sept. 4, 1826; was graduated at Columbia College in 1843 and later admitted to the bar; abandoned law for teaching and for many years conducted a large collegiate school in his native city. He was author of “First Lessons in Composition” (1851); “Advanced Course of Rhetoric and Composition” (1854); “School History of the United States” (1857); “Natural Philosophy” (1859); etc. He died in New London, N. H., July 24, 1881.

Quackenbos, John Duncan, an American physician; born in New York, N. Y., April 22, 1848; was graduated at Columbia College in 1866 and at the College of Physicians and Surgeons in 1871; began practice in New York; became Adjunct Professor of the English Language and Literature at Columbia College in 1884; Professor of Rhetoric in Barnard College in 1891–1893. He then became a specialist in mental diseases and lectured extensively on scientific and literary topics. He wrote “History of the World”; “History of Ancient Literature”; “Tuberculosis”; and numerous historical, medical, and religious works.

Quackenbush, Stephen Platt, an American naval officer; born in Albany, N. Y., Jan. 23, 1823; joined the navy in 1840; promoted lieutenant-commander in 1862; had charge of various vessels in blockading fleets during the Civil War; participated in the action at Elizabeth City and Newbern, N. C., captured the “Princess Royal” containing a cargo of machinery for making projectiles, quinine, and engines for an iron-clad in course of construction in Richmond; and won distinction in other operations. He was retired with the rank of rear-admiral in 1885. He died in Washington, D. C., Feb. 4, 1890.

Quader Sandstone, a siliceous sandstone of Cretaceous age, with many fossil shells identical with those of the English Chalk. It is sometimes 600 feet thick, and, being jointed and often precipitous, has much to do with producing the picturesque aspect of Saxon Switzerland.

Quadi, a Teutonic tribe whose ancient territory was on the Danube, extending to the Theiss on the E. and to the Carpathian Mountains on the N. They long waged destructive wars with the Romans, particularly under Marcus Aurelius, but cease to be heard of in the 5th century, having probably migrated further W. with the Suevi.

Quadragesima (“fortieth”), the Latin name for the whole season of Lent, with its 40 days (so also its French derivative, *carême*); but the name is commonly assigned to the first Sunday in Lent, by analogy with the three Sundays which pre-

cede Lent—Septuagesima, Sexagesima, and Quinquagesima.

Quadrangle, a square or four-sided court or space surrounded by buildings, as often seen in the buildings of a college,



QUADRANGLE OF LINCOLN COLLEGE, OXFORD.

school, etc. In geometry, a figure having four angles, and consequently four sides.

Quadrant, in architecture, the same as QUADRANGLE (*q. v.*). In geometry, the fourth part of a circle; the arc of a circle containing 90° ; the space included between such arc and two radii drawn from the center to the extremities of the arc. Nautically, an instrument for making angular measurements. So called from its embracing an arc of 90° or somewhat more. Formerly much employed in making astronomical observations. It is now superseded by the SEXTANT (*q. v.*).

Quadrate Bone, in comparative anatomy, a bone by means of which the rami are articulated with the skull in birds, reptiles, and fishes (often called the hypotympanic bone).

Quadrature, the state of being quadrate or square; a square space. In astronomy, the position of one heavenly body with respect to another 90° distant, as the moon when midway between the points of opposition and conjunction. In geometry, the act of squaring; the reducing of a figure to a square. The quadrature of the circle is a famous problem, which has probably been the subject of more discussion and research than any other problem within the whole range of mathematical science. The area of the circle being equal to a rectangle described on the radius and half of the circumference, it follows that the quadrature would be possible if an algebraic expression, with a finite number of terms, could be found for the length of the circumference. Hence, the problem is reduced to finding such an expression, or to finding an exact expression in algebraic terms for the ratio of the

diameter to the circumference. No such expression has yet been found, and it is by no means probable that such an expression will ever be found. The problem may safely be classed with the problems for the geometrical tri-section of an angle, the duplication of the cube, etc., all of which are now regarded as beyond the power of exact geometrical construction.

Quadratures, Method of, any arithmetical method of determining the area of a curve. When the exact area is known a square whose area is equal to it can be found—hence the term “quadratures.” It has been shown (see CALCULUS) that the area of a curve whose equation is $y=f(x)$ is $\int ydx$, and can therefore be found when the integral can be evaluated. Hence the approximate determination of the value of a definite integral is obtainable by the method of quadratures.

Let it be required to find the area bounded by a portion of a curve, the ordinates at its extremities, and the axis. The usual method of procedure is to divide the portion of the axis which is included between the two ordinates into a number of equal parts, and to erect ordinates at the points so obtained. The area is approximately equal to the product of one of the given equal parts into half of the sum of the two extreme ordinates together with the sum of all the intermediate ordinates. To obtain a very accurate result by this process the number of equidistant ordinates must be so great that the portions of the curve which are intercepted by successive ordinates are very nearly straight.

A better method, due to Simpson, consists in drawing, through the first, second, and third points obtained as above on the curve, a parabola whose axis is parallel to the ordinates, and repeating this process with the third, fourth, and fifth points, and so on—the points being chosen so that the total number of points is even. The area of the given curve will be approximately equal to the sum of the areas of the various portions of the parabolas included between successive ordinates when these ordinates are sufficiently close together. It is therefore approximately equal to one-third of the product of one of the given equal portions of the axis into the sum of the extreme ordinates together with twice the sum of all the odd intermediate ordinates and four times the sum of all the even intermediate ordinates.

When the successive equidistant ordinates are very close together, the area is approximately equal to the product of the common intercept on the axis between successive ordinates into the sum of all the ordinates. The labor involved in the estimation of an area by this process would be fatal to its

Quadrigæ

employment unless the number of ordinates was small. But, if the ordinates were few in number, considerable error would in general result unless a correction could be applied. The method adopted in the process is known as the method of quadratures par excellence. This method is of extreme utility in the evaluation of definite integrals when rigorous processes are not attainable.

Quadrigæ, in Roman antiquities, a two-wheeled car or chariot drawn by four horses, harnessed all abreast. It was used in the Circensian games of the Romans. In monumental work it is the figure, as thus described, surmounting an arch or main structure.

Quadrilateral, the name given in history to the four fortresses of North Italy—Mantua, Verona, Peschiera, and Legnaco—



VENETIAN QUADRILATERAL.

which form a sort of outwork to the bastion of the mountains of the Tyrol, and divide the N. plain of the Po into two sections by a most powerful barrier. They have figured in all the later wars that have been fought in North Italy, especially in the wars between Austria and the different Italian states. Russia has a similar combination of four fortresses in Poland called the Polish Quadrilateral.

Quadrille, a dance consisting of five figures or movements, executed by four sets of couples, each forming the side of a square. Also, the music composed for such a dance; and, a game of cards played by four persons with 40 cards, the tens, nines, and eights being thrown out from an ordinary pack.

Quadr sacramentarian, or **Quadr sacramentalist**, a controversial term applied to some German reformers in Wittenberg and its neighborhood, who held that the Sacraments of Baptism, the Eucharist, Confession, and Orders were generally necessary to salvation. They are mentioned by Melancthon in his "Locis Communes."

Quagga

Quadrivium, in the Middle Ages an educational course consisting of the four mathematical sciences, arithmetic, music, geometry, and astronomy.

Quadroon, or **Quarteron**, a person who is one-quarter negro and three-quarters white; that is, one of whose grandparents was white and the other negro; and one of whose immediate parents was white and the other mulatto.

Quadrumania, in zoölogy, an order of Mammalia, founded by Cuvier, and containing the monkeys, apes, baboons, and lemurs (the Linnæan genera *Simia* and *Lemur*). Owen divided it into three groups, Catarrhina, Platyrrhina, and Strepsirrhina. The earliest known remains are those of *Lemuravus*, from the Eocene of New Mexico.

Quadruped, the name popularly applied to those higher vertebrate animals which possess four developed limbs. The name is usually restricted to four-footed mammals.

Quadruple Alliance, an alliance, so called from the number of the contracting parties, concluded in 1718 between Great Britain, France, and Austria, and acceded to by Holland in 1719, for the maintenance of the peace of Utrecht. The occasion of the alliance was the seizure by Spain of Sardinia in 1717, and Sicily in 1718, both of which she was forced to give up. Another quadruple alliance was that of Austria, Russia, Great Britain, and Prussia, in 1814, originating in the coalition which had effected the dissolution of the French empire.

Quæstor, in Roman history, two *quæstores parricidii*, who acted as public prosecutors in cases of murder, or any capital offense, existed in Rome during the period of the kings. Two *quæstores classici*, who had charge of the public money, were first appointed about 485 B. C. The number was doubled B. C. 421, and it was decided that they should be chosen from the patricians and the plebeians. It was not, however, till 409 B. C. that a plebeian was elected, and then the choice fell on three plebeians and one patrician. They also had charge of the funds of the army, to which they were paymasters. The number of quæstors was increased to eight 265 B. C. Sylla raised the number to 20, and Julius Cæsar to 40. During the time of the emperors their number varied; and from the reign of Claudius I. (41-54) it became customary for quæstors, on entering office, to give gladiatorial spectacles to the people; so that none but the wealthiest Romans could aspire to the office.

Quagga, *Equus (Asinus, Gray) quagga*, a striped equine form, from South Africa, now nearly, if not entirely, extinct. Buckley, notes that, though even then "apparently unknown" in 1836 "it was very nu-

Quail

merous in the plains N. (a misprint for S.) of the Vaal river." Height at shoulders about four feet; striped only on head, neck, and shoulders; prevailing color brown; abdomen, legs, and part of tail whitish-gray.

Quail, the genus *Coturnix*, especially *C. communis*, or *dactylisonans*, the latter name having reference to the peculiar dactylic call of the male, which has given rise to the provincial name of wet-my-lips, wet-my-feet, from a supposed similarity of sound. It is widely distributed over the Eastern Hemisphere, visiting Europe in early summer and returning S. in the autumn, when immense numbers are caught and fattened for the market, as their flesh is much



QUAIL: LOPHORTYX CALIFORNICUS.

esteemed. Length about seven inches, general color reddish-brown, with buff streaks on the upper surface; throat rufous; head dark-brown above, striped with ochreous white, sides reddish-brown, lower parts pale buff, fading into white on belly. Color less bright in the hen bird, and the rufous tinge absent from the throat. They nest on the ground, laying from 9 to 15 pyriform yellowish-white eggs, blotched with dark-brown. The males are polygamous and extremely pugnacious.

The name is often applied to members of the American genera *Ortyx* and *Lophortyx*; the genus *Excalfactoria* contains the dwarf quails, and the family *Turnicidæ* the bush quails.

Quain, a family of eminent medical men. (1) JONES QUAIN, born in November, 1796, in Mallow, Ireland, studied medicine at Dublin and Paris, and in 1829 was appointed lecturer on anatomy and physi-

ology in the Aldersgate School of Medicine, London. Two years later he was made Professor of Anatomy and Physiology at London University, and held that post till 1836. The well-known students' textbook, Quain's "Elements of Anatomy," was originally written by him; the first edition appeared in 1828, the tenth in 1890. Jones Quain published also a series of elaborate "Anatomical Plates" (1858) and a translation of Martinet's "Pathology" (1835). He died in London, Jan. 27, 1865. (2) RICHARD QUAIN, brother of the above; born in Fermoy, Ireland, in July, 1800, studied at London, and was appointed Professor of Anatomy and Clinical Surgery in University College, London, in 1837. He was likewise appointed surgeon-extraordinary to the queen, and was elected president of the Royal College of Surgeons in 1868. Among his works the principal are: "Anatomy of Arteries," with folio plates (1845); "Diseases of the Rectum" (1854); "Observations on Medical Education" (1865); "Some Defects of Medical Education" (1870); and articles on "Dislocations of the Hip and the Knee"; he edited along with others the fifth edition of (Jones) "Quain's Anatomy." By his will he left nearly \$375,000 to University College, London, for the "education in modern languages (especially English) and in natural science." He died in London on Sept. 15, 1887. (3) SIR RICHARD QUAIN, Bart., first cousin to both the above, was born in Mallow, Oct. 30, 1816. He was Lumleian lecturer at the Royal College of Physicians ("Diseases of the Muscular Walls of the Heart") in 1872, and Harveian orator ("The Healing Art in its Historic and Prophetic Aspects") in 1885, and was made physician extraordinary to the queen. He edited the "Dictionary of Medicine" (1883; 17th thousand, 1891), and contributed to the "Translation of the Medical and Chirurgical Society"; the "London Journal of Medicine," etc. Dr. Quain was made LL. D. of Edinburgh in 1889, president of the General Medical Council in 1891, was created a baronet in 1891, and died March 13, 1898. (4) SIR JOHN RICHARD QUAIN; born in Mallow in 1817, the half-brother of Jones and Richard Quain, was made a judge of the Court of Queen's Bench in 1872, and justice of the High Court of Judicature in 1875. He died Sept. 12, 1876.

Quaker City, Philadelphia, which was planned and colonized by William Penn and other members of the Society of Friends.

Quakers. See FRIENDS, SOCIETY OF.

Quaking Grass, *Briza*, a genus of grasses, having a loose panicle; drooping spikelets, generally remarkable for their

Quamash

broad and compressed form, suspended by most delicate footstalks, and tremulous in every breath of wind; the spikelets with two glumes and numerous florets, the florets having each two awnless paleæ, which become incorporated with the seed. The species are few and mostly European. They are all very beautiful. *B. maxima*, a native of the S. of Europe, is often planted in flower gardens. *B. media*, the only species common in Great Britain, growing in almost all kinds of poor soil, from the seacoast to an elevation of 1,500 feet, is of some value as a pasture grass, being very nutritious, although the quantity of herbage is scanty. The value of many poor pastures very much depends on it, but when they are enriched by manures it generally disappears. It is



QUAKING GRASS.

sometimes sown by farmers, but not nearly to such an extent as it would be if its seed did not lose vitality so quickly that only a small proportion grows if it is not sown in autumn when newly ripened.

Quamash, the North American name of *Camassia esculenta*, a plant of the lily family with an edible bulb. These bulbs are much eaten by the Indians, and are prepared by baking in a hole dug in the ground, then pounding and drying them into cakes for future use.

Quamoclit, in botany, a genus of *Convolvulææ*. They are twiners with cordate leaves and red flowers, natives of the trop-

Quarantine

ics. Type, the cardinal quamoclit (*Quamoclit vulgaris*).

Quandang, in botany: (1) The edible fruit of *Santalum acuminatum*. (2) *Fusanus acuminatus*, one of the Santalaceæ. The nut, which resembles an almond, is eaten by the native Australians.

Quandt, Johann Gottlob von, a German author; born in Leipsic, April 9, 1787. He wrote: "History of Copperplate Engraving" (1826); "Letters from Italy" (1830); "Observations and Fancies Regarding Man, Nature, and Art, during a Tour in Southern France" (1846); and a similar work on Spain (1850). He died June 18, 1859.

Quantification, the act or process by which anything is quantified; the act of determining the quantity or amount, especially used as a term in logic. Of late it has been proposed to quantify the predicate as well as the subject of the propositions of a syllogism, *i. e.*, instead of writing as at present, All A is B, some A is B, to write, all (or some) A is (all or some) B.

Quantity, in grammar and prosody, the measure of a syllable or the time in which it is pronounced; the metrical value of syllables as regards length or weight in their pronunciation. In logic, the extent to which the predicate in a proposition is asserted of the subject.

In mathematics, anything that can be increased, diminished, and measured. Thus, number is a quantity; time, space, weight, etc., are also quantities. In mathematics, quantities are represented by symbols, and for convenience these symbols themselves are called quantities. In algebra, quantities are distinguished as known and unknown, real and imaginary, constant and variable, rational and irrational. Real quantities are those which do not involve any operation impossible to perform; variable quantities are those which admit of an infinite number of values in the same expression; rational quantities are those which do not involve any radicals. A simple quantity is expressed by a single term, as *a* or *b*; a compound quantity by two or more terms connected by the signs + (plus) or - (minus). Quantities which have the sign + prefixed to them are called positive or affirmative; those to which the sign - is prefixed are called negative. Similar quantities are such as consist of the same letters, and the same powers of the letters, as *abc*, - *2abc*, + *4abc*, etc.

Quarantine, the period (originally 40 days) during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, is forbidden intercourse with the place at which she arrives. Quarantine was first introduced at Venice in the 14th century. It is now re-

quired to be performed in almost every important country except Great Britain. By act of the United States Congress passed in 1879 national quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot, or owner of any vessel entering a port of the United States in violation of the act, or regulations framed under it. During the period of quarantine, all the goods, clothing, etc., that might be supposed capable of retaining infection, are subjected to a process of disinfection, which is a most important part of the quarantine system.

From Nov. 7, 1896, the system of quarantine ceased to exist in Great Britain, so far as regards the British Islands. The Quarantine Act of 1825 required that quarantine should be performed by vessels coming to the British Islands from places from which "the plague or other infectious disease or distemper highly dangerous to the health of his Majesty's subjects" might be brought; but in recent years this act has applied only to the plague and yellow fever, and has not often been used. Vessels arriving from infected places or carrying goods, etc., from such places, were required to be kept at some safe distance from the shore and from other ships—all their passengers and crew being detained on board—till all danger of spreading infection was considered to have passed. Healthy persons were thus exposed to the risk of taking any disease there might be on the ship.

In some places quarantine establishments were maintained for receiving persons from suspected vessels, but most of these were long since abolished, and latterly the only such receiving ships were some old hulks at the Motherbank in the Solent. These were maintained by the Privy Council, on whom devolved the administration of the Quarantine Acts. Orders in Council prescribed the system of quarantine. By the Public Health Act of 1875, the defense of the country against cholera was placed in the hands of the Local Government Board, and regulations were issued by that board for the purpose. Instead of quarantining the entire crew of an infected or suspected vessel, the method adopted consisted in the medical inspection of the persons on board, and the separation and detention of those who were suffering from cholera or who were suspected of being affected. All others were permitted to leave the ship, but were traced and watched by the local authorities. Infected articles on board were to be disinfected or destroyed.

Quarantine has long been considered ineffective against the introduction of disease, besides being a source of much danger to those who were compulsorily detained under the system. The sanitary ideas of our

day favor the less showy but safer methods long used in England in case of cholera. The fate of quarantine in the British Islands was determined in 1894 when, in discussion on the Privy Council estimates objection was made to the cost of maintaining the quarantine establishment in the Solent on the ground of its uselessness, and the government promised to abolish the system. As a result the Public Health Act of 1896 was passed, by which yellow fever and the plague are to be dealt with in the same manner as cholera, and regulations made by the Local Government Board will apply equally to the three diseases.

In the United States under the law of March 28, 1890, known as the Interstate Quarantine Act, the supervising surgeon-general of the Marine Hospital Service is charged with preparing the rules and regulations, under direction of the Secretary of the Treasury, necessary to prevent the introduction of certain contagious diseases from one State to another, and he has also supervision of the medical inspection of alien immigrants, which, under the law of March 3, 1891, is conducted by the medical officers of the Marine Hospital Service. Under the act of February 15, 1893, he is charged with the framing of regulations for the prevention of the introduction of contagious diseases and the prevention of their spread; and he is also charged with the conduct of the quarantine service of the United States. He has the direction of laboratories established to investigate the cause of contagious diseases, and publishes each week, under the title of "Public Health Reports," sanitary reports received from all parts of the United States and (through the State Department) from all foreign countries. See BUBONIC PLAGUE: CATTLE PLAGUE.

Quarles, Francis, an English poet; born near Rumford, England, in 1592; was educated at Cambridge, and entered at Lincoln's Inn. He was for some time cup bearer to Elizabeth, Queen of Bohemia, and in 1621 went to Dublin, where he became under-secretary to Archbishop Ussher. He was driven from Ireland, with the loss of his property, by the rebellion of 1641, and was appointed chronologer to the city of London. At the commencement of the civil wars he wrote a work entitled the "Loyal Convert," which gave offense to the Parliament; and when he afterward joined the king at Oxford his property was sequestered, and his books and MSS. plundered. He was so much affected by his losses that grief is supposed to have hastened his death. Of the works of Quarles, in prose and verse, the most celebrated is his "Emblems," a set of designs illustrated by verses. Among his poems are "Divine Poems," "Divine

Fancies," and "Argalus and Parthenia." His "Enchiridion" is a collection of brief essays and aphorisms, in vigorous and occasionally eloquent language. He died Sept. 8, 1644.

Quarnero, Gulf of, in the Adriatic Sea, between Istria and the Croatian coast, 15 miles in length and breadth. It is nearly inclosed to the leeward by the islands of Cherso and Veglia, and communicates with the Adriatic by three channels. The seamen of that region dread the gulf on account of the terrific storms to which it is subject.

Quarrel, a bolt or dart to be shot from a cross-bow or thrown from an engine or catapult; an arrow having four projecting pointed heads and pyramidal point.

Quarry, a place, pit, or mine where stones are dug out of the earth, or are separated from the mass of rock by blasting. The term mine is generally confined to pits or places whence coal or metals are taken; quarry to those from which stones for building, etc., as marble, slate, etc., are taken. A mine is subterranean, and reached by a shaft; in a quarry the overlying soil is simply removed.

Quart, the fourth part of a gallon; two pints; the United States dry quart contains 67.20 cubic inches, the fluid quart 57.75 cubic inches; the English quart contains 69.3185 cubic inches. The old English quart for wine and spirits contained 57.75 cubic inches; that for beer and ale 70.5 cubic inches, and that for dry measure 67.2 cubic inches nearly.

Quarter, a measure of weight, equal to the fourth part of a hundredweight — *i. e.*, to 28 pounds avoirdupois. As a measure of capacity, for measuring grain, etc., a quarter contains eight bushels.

Quarter, that part of a ship's side which lies toward the stern, or which is comprehended between the aft-most end of the main chains and the sides of the stern. In heraldry, one of the divisions of a shield, when it is divided into four portions by horizontal and perpendicular lines meeting in the fesse point; an ordinary occupying one-fourth of the field, and placed (unless otherwise directed) in the dexter chief.

Quarter Day, in matters influenced by United States statutes quarter days are the 1st of January, April, July, and October. In the relation between landlord and tenant in some of the States they are the 1st of May, August, November, and February, respectively. In England it is the day which begins each quarter of the year. They are now Lady day (March 25), Midsummer day (June 24), Michaelmas day (Sept. 29), and Christmas day (Dec. 25). In the old style they were Old Lady day (April 6), Old

Midsummer day (July 6), Old Michaelmas day (Oct. 11), and Old Christmas day (Jan. 6).

Quarter Deck, in nautical language, a deck raised above the waist and extending from the stern to the mainmast. It is especially a privileged portion of the deck, being the promenade of the superior officers or of the cabin passengers. The windward side is the place of honor.

Quartering. See DRAWING AND QUARTERING.

Quartermaster, in military affairs, an officer who superintends the issue of stores, food, and clothing, and arranges transportation for a regiment when necessary. In nautical affairs, a petty officer, who, besides having charge of the stowage of ballast and provisions, coiling of ropes, etc., attends to the steering of the ship. He is appointed by the captain.

Quartermaster-general, in the United States a staff-officer with rank of Brigadier-General. He is chief officer in the quartermaster's department. In England a staff-officer, specially appointed for duties connected with quartering, encamping, embarking, and moving troops. In both armies in the field he is responsible for the surveys and reconnaissance necessary for the conduct of the army, and has the general direction of the railway, postal, signaling, and telegraph services.

Quartermaster-sergeant, in the United States, one whose duty it is to assist the quartermaster. In England the senior sergeant in the quartermaster's department of a regiment. He is responsible to the quartermaster for the issuing of stores and other duties connected with the office. He ranks next the sergeant-major.

Quatern, a term sometimes used to designate the fourth of a peck, or of a stone; as the quatern loaf. In liquid measure it is the fourth part of a pint.

Quarter Seal, the seal kept by the director of the Chancery of Scotland. It is in the shape and impression of the fourth part of the Great Seal, and is in the Scotch statutes called the Testimonial of the Great Seal. Gifts of land from the crown pass this seal in certain cases.

Quarter Sessions, in England, a general court of criminal jurisdiction held in every county once in each quarter of a year before two or more justices of the peace, and before the recorder in boroughs. Its jurisdiction is confined to the smaller felonies and misdemeanors against the public, and certain matters rather of a civil than a criminal nature, such as the regulation of weights and measures; questions relating to the settlement of the poor; bastardy; and appeals against a multitude of orders or

convictions, which may be made in petty sessions, within the laws relating to the revenue, the highways, and other matters of a local nature. In most of these cases an appeal lies to the higher court.

In Scotland, a court held by the justices of the peace four times a year at the county towns. These courts have the power of reversing the sentences pronounced at the special and petty sessions, when the sentence is of a nature subject to review. Such cases as fall to be tried by the English courts of quarter sessions are chiefly disposed of in Scotland in the sheriff courts of the county.

Quarterstaff, a stout staff used as a weapon of offense or defense. It was generally about 6½ feet long, and loaded with iron at each end. It was grasped by one hand in the middle, and by the other between the middle and one end. In use the latter hand was passed rapidly from one quarter of the staff to the other, thus giving the weapon a rapid circular motion, and bringing the loaded ends on the adversary at unexpected points.

Quartet, a piece of music arranged for four voices or instruments, in which all the parts are *obligati*; i. e., no one can be omitted without injuring the proper effect of the composition. Vocal quartets are generally accompanied by instruments to sustain the voices. A mere interchange of melody, by which the parts become in turn principal and subordinate, without any interweaving of them, does not constitute a quartet. Quartets for stringed instruments are generally arranged for two violins, a cello, and violoncello.

Quartley, Arthur, an American artist; born in Paris, May 24, 1839. He came to the United States when a boy, and gained a reputation as a decorator, but it was not till after 1875 that he became known as an artist of merit. His first picture which brought him into notice was very large, showing a waste of water beating against a rock. It was exhibited at the Academy of Design, and belongs to Wellesley College. He had a fondness for wild marine and coast scenes. He was elected a National Academician in 1886, and died in New York, May 24 of that year.

Quarto, name of the size of a book in which a sheet makes four leaves. Frequently abbreviated to 4to. Also a book formed by folding a sheet twice, making four leaves, eight pages. The term, by modern usage, refers to a book of nearly square form. The proportions vary according to the size of the sheets.

Quarto-Decimans, those who, after the final decision of the Council of Nicæa, continued to hold that it was obligatory on Christians to celebrate Easter on the 14th

day of the first lunar month near the vernal equinox, whether that 14th day fell on Sunday or not, or who, even before the Council of Nicæa, held the observance of the Jewish Passover to be of obligation. The controversies as to the celebration of Easter long divided the Church, but are no longer waged.

Quartz, in mineralogy, a rhombohedral or hexagonal mineral, crystallizing mostly in hexagonal prisms with pyramidal terminations. Cleavage rhombohedral, very imperfect, and rarely obtainable. Found also massive, and of varying texture. Hardness, 7; sp. gr., 2.5-2.8; pure, crystallized varieties, 2.66; luster, vitreous, sometimes resinous, splendid to dull; colorless, but when impure of varying shades of many colors; streak, white, in colored kinds sometimes of the same color, though paler; transparent to opaque; fracture, conchoidal to subconchoidal. Plates cut at right angles to the vertical axes exhibit circular polarization. Composition: Oxygen, 53.33; silicon, 46.67 = 100; formula, SiO₂, or pure silica. Dana groups the numerous varieties of this mineral as follows:

A. Phenocrystalline or vitreous varieties: 1. Ordinary crystallized, rock crystal; (a) regular crystals, or limpid quartz, (b) right-handed crystals, (c) left-handed crystals, (d) cavernous crystals, (e) capped quartz, (f) drusy quartz, (g) radiated quartz, (h) fibrous quartz. 2. Asteriated or star-quartz. 3. Amethyst. 4. Rose. 5. Yellow, or false topaz. 6. Smoky or cairngorm. 7. Milky. 8. Siderite, or sapphire quartz. 9. Sagenitic, inclosing acicular crystals of other minerals such as rutile, tourmaline, gothite, stibnite, asbestos, hornblende, and epidote. 10. Cat's eye. 11. Aventurine. 12. Impure from the presence of distinct minerals densely diffused.

B. Cryptocrystalline: 1. Chalcedony. 2. Carnelian. 3. Chrysoprase. 4. Prase. 5. Plasma, including the heliotrope or bloodstone. 6. Agate; (a) banded, (b) irregularly clouded, (c) colors due to visible impurities, including moss-agate, mocha-stone, and dendritic agate, (d) agatized wood. 7. Onyx. 8. Sardonyx. 9. Agate-jasper. 10. Siliceous sinter. 11. Flint. 12. Hornstone or chert. 13. Basanite, lydian-stone or touchstone. 14. Jasper.

C. Includes various quartz rocks, and the pseudomorphous varieties such as haytorite, beekite, babel-quartz, etc.

Crystals are occasionally found very large; in Paris and Milan are some which weigh about eight hundredweight. Quartz is abundantly distributed, is an essential constituent of many rocks, notably granite, gneiss, various schists, and constitutes the larger part of mineral veins. Many of its varieties are largely employed in jewelry.

Quartz Rock, the name applied to all rocks consisting essentially of massive quartz.

Quasimodo, in the Roman calendar, a term applied to the first Sunday after Easter, from the opening words of the introit for that day, "*quasi modo geniti infantes*" = as (infants) lately (born).

Quass, or **Quas**, a thin, sour, fermented liquor, made by pouring warm water on

Quassia

rye or barley meal, and drunk by the peasants of Russia.

Quassia, in botany the typical genus of the order *Simarubaceæ*. Flowers hermaphrodite; corolla five-parted; stamens, 10,



QUASSIA: BITTERWOOD.
a, Fruit.

longer than the petals; the fruit consisting of five fleshy drupes. *Q. amara* is a tree cultivated in the West Indies and the parts adjacent. It has terminal clusters of large, red flowers, and unequally pinnate leaves. In pathology, the Surinam quassia is *Q. amara*; Jamaica quassia, the wood of *Picræna excelsa*. It comes to this country in logs or billets, and is retailed as chips or raspings. It is given as an extract, an infusion, or a tincture, and acts as a pure bitter and stomachic, and as an antiperiodic. An infusion of it is used to poison flies, and, in the form of an enema, to destroy threadworms.

Quaternary, or **Post-Tertiary**, the fourth great division of the fossiliferous strata, which embraces the Pleistocene or Glacial and Post-glacial and Recent systems.

Quaternion, in mathematics, the metrographic relation existing between any two right lines, having definite lengths and directions in space, depending on four irreducible geometrical elements. Discovered and developed by Sir W. Hamilton, who thus described it:

"A quaternion is the quotient of two vectors, or of two directed right lines in space, considered as depending on a system of four geometrical elements, and as expressible by an alphabetical symbol of quadrinomial form."

Quathlamba Mountains, a range in South Africa, forming the W. boundary of Zululand and Natal; also called the Drakensberg Mountains.

Quatremère

Quatre-Bras, a village of Belgium; about 10 miles S. S. E. of Waterloo; at the intersection of the great roads from Brussels to Charleroi, and from Nivelles to Namur, whence its name ("four arms"). On June 16, 1815, two days before the battle of Waterloo Quatre-Bras was the scene of a desperate battle between the English under Wellington and the French under Ney. The honors of the field remained with the former; but the severe defeat of Blücher the same day at Ligny compelled Wellington to retreat. The loss on the English side was 5,200, on the French 4,140, among the allies being the Duke of Brunswick, the gallant chief of the Black Brunswickers. A monument to his memory, a bronze lion 10½ feet high, was erected in 1890.

Quatrefages, Jean Louis Armand de, a French naturalist; born in Berthezème, France, Feb. 10, 1810; studied medicine at Strasburg, and in 1838 was appointed Professor of Zoölogy at Toulouse. But this post he soon resigned and went to Paris, to study further for himself. In 1850 he was elected Professor of Natural History in the "Lycée Napoléon," and in 1855 of Anatomy and Ethnology at the Natural History Museum in Paris. He devoted his attention principally to anthropology and the lower animals, especially annelids. His chief works are: "The Human Species" (1877; Eng. trans. 1879); "Memoirs of a Naturalist" (1854; Eng. trans. 1857); "Unity of the Human Species" (1861); "The Prussian Race" (1879; Eng. trans. 1872); "The Pygmies" (1887); "Darwin and His French Forerunners" (1892); and "Transformist Theories" (1892). He died Jan. 13, 1892. See ANTHROPOLOGY.

Quatrefoil, in architecture, a piercing or panel divided by cusps or foliations into four leaves, or more correctly the leaf-shaped figure formed by the cusps. It is supposed to represent the four leaves of a cruciform plant. The name is also given to flowers and leaves of a similar form carved as ornaments on moldings, etc. It differs from the cinquefoil only in the number of cusps. In heraldry, four-leaved grass; a frequent bearing in coat-armour.



QUATREFOIL IN ARCHITECTURE.



QUATREFOIL IN HERALDRY.

Quatremère, Etienne Marc, a French Orientalist; born in Paris, July 12, 1782. His father was a merchant, while he was himself a lifelong student. He was successively employed in the Imperial Library, in the chair of Greek at Rouen, in the Academy of Inscription, in the Collège de France

as Professor of Hebrew and Aramaic, and in the School of Living Oriental Languages as Professor of Persian. He produced many learned works, among which are: "Investigations into the Language and Literature of Egypt" (1808); "Mémorial upon the Nabateans" [the Nabathites of the Bible] (1835); together with numerous valuable translations. He left also much lexicographic material. He died in Paris, Sept. 18, 1857.

Quatremère de Quincy, Antoine Chrysostome, a French archæologist; born in Paris, Oct. 28, 1755; held political offices under the republic, consulate, empire, and restoration, and in 1818 became Professor of Archæology in the Royal Library. His works include: "Dictionary of Architecture," "Imitation in the Fine Arts" and lives of Raphael, Canova, and Michael Angelo. He died in Paris, Dec. 8, 1849.

Quattrocento, a term applied to the characteristic style of the artists who practised in the 14th century; it was hard, rigid, and peculiar in color as well as in form and pose. It was the intermediate stage of that progressive period of art, which, commencing with Fra Angelico, reached excellence with Leonardo da Vinci.

Quaver, a shake or rapid vibration of the voice; a shake on an instrument of music. Also a note and measure of time, equal to half a crochet or the eighth of a semibreve.

Quay, a landing place; a wharf projecting into a stream, harbor, or basin, to which vessels are moored for the purpose of receiving and delivering freight.

Quay, Matthew Stanley, an American legislator; born in Dillsburg, Pa., Sept. 30, 1833; was graduated at Jefferson College in 1850, and admitted to the bar in 1854; entered the Union army in 1861 and won distinction; was promoted lieutenant-colonel and assistant commissary general; received a congressional medal of honor for exceptional service; became State treasurer of Pennsylvania in 1885; and was a United States Senator in 1887-1899. Early in the latter year he was placed on trial on charges of misappropriation of public funds, and on April 21 was acquitted. Governor Stone appointed him United States Senator *ad interim* on the same day, and in January, 1901, he was reëlected to the United States Senate to fill out the vacant term caused by the failure of the Legislature to elect a Senator in January, 1899. He died at Beaver, Pa., May 28, 1904.

Quebec, a province of the Dominion of Canada, bounded on the N. by the district of Ungava and James bay; on the S. by the Ottawa river, separating it from Ontario, the States of New York, Vermont, New

Hampshire, and Maine, the province of New Brunswick, and the Gulf of St. Lawrence; on the E. by Labrador; and on the W. by Ontario. Its greatest length from E. to W. is about 1,000 miles, and its greatest width from N. to S. is about 550 miles. Its total area is 351,873 square miles, of which 10,117 square miles are under water, exclusive of the Gulf of St. Lawrence.

Physical Characteristics. — The chief physical feature of the province is the valley of the St. Lawrence, which lies between the base of the Laurentian plateau and the Appalachian mountain system. W. of the city of Quebec the elevations of the Appalachian system and the base of the Laurentian highlands take different directions, and the St. Lawrence flows through an extensive and fertile plain of more than 10,000 square miles, admirably suited to the growth of grain, root crops, and fruits. The Laurentian plateau on the N. of the St. Lawrence extends much farther N. and W. than the limits of the province, but about a third of the Laurentian highlands, or Height of Land, is contained within those limits, and forms the watershed which separates the rivers flowing into James bay on the N. W. from those flowing into the Ottawa and St. Lawrence rivers and the Gulf of St. Lawrence. East of the St. Lawrence plain, extending to Quebec and thence along the S. bank of the St. Lawrence through the Gaspé peninsula, is a broken and mountainous country, though having no great elevations, the highest being Sutton mountain in the Notre Dame range. Geologically, the Laurentian plateau consists of crystalline rocks of the Archæan and Palæozoic divisions. The fertile portion of the St. Lawrence valley rests on beds of limestone rocks of the Palæozoic age; and the strata of the E. mountainous region extending into the Gaspé peninsula are also composed of hard and crystalline rocks.

The chief river, the St. Lawrence, with its tributaries, drains the greater portion of the province. The principal tributaries from the N. are the Ottawa, St. Maurice, Batiscau, Jacques Cartier, Montmorency, and the wonderfully picturesque Saguenay; from the S. the Richelieu, St. Francis, Bécancour, and Chaudière. The East Main and Nottaway rivers flow northwesterly into James bay. The principal lakes are Lake Mistassini in the N. and Lake St. John, through which flows the Saguenay. There are a large number of smaller lakes. The island of Anticosti, at the mouth of the St. Lawrence, and the Magdalen group of islands in the Gulf of St. Lawrence, belong to the province.

Soil and Climate. — The soil in the older and more thickly settled portion is fertile, chiefly a rich loam, and well adapted to the cultivation of grain, root crops, apples and

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many varieties of small fruits. The winters are long and cold and the summers short and warm; but the dry, bracing atmosphere makes extremes of heat and cold endurable. The snowfall is abundant, and greatly facilitates transportation in the important lumber industry. The fall season is the most attractive. In the extreme E. and N. the winters are longer and more severe.

Minerals and Mining.—The province is rich in mineral resources, but they are imperfectly developed. Gold (in small quantities), copper, iron, lead, platinum, mica, silver, zinc, and nickel occur. Slate, granite and other building stones of good quality are also found in large quantities. The most important by far of the minerals is asbestos, whose value in 1905 was \$1,486,359. It is obtained from the serpentine rocks in the eastern townships. The total annual mineral production of the province amounts in value to about \$4,000,000. Asbestos, granite, copper, iron ore, mica, ochre (calcined) are important in the order named. There are a few blast furnaces for pig iron, but the production is not large. The lack of coal is a serious drawback in the development of the mineral industry. During 1905-06 important discoveries were made in the Chibogomo and Temiscaming districts, the latter being N. and E. of Lake Temiscaming. Ores of asbestos, copper, iron, gold, and cobalt (with important indications of silver) were found. The new Transcontinental railway will open up these districts to settlement.

Forests.—The maple, beech, oak, hickory, elm, birch, pine, cedar, spruce and tamarack are found in the forests of the St. Lawrence valley. In the Laurentian highlands, south of the Height of Land, the tamarack, spruce, and pine are found in abundance; the spruce is valuable to the pulp industry. In the N. and along the coast of the Gulf of St. Lawrence there are forests of the same kind, but not so well grown. Forest reserves have been set aside under government management and restrictions, such as Laurentides National park, Rimouski forest reserve and the Saguenay and Gulf forest reserves. It is estimated that fully one-half the land area of the province is public land, and of this only about 7,000,000 acres have been surveyed. There has been a substantial improvement in methods of replanting and of protection of the forests against fire. During the year ending June 30, 1905, there were 69,226 square miles of crown lands under timber license, yielding 198,615 cubic feet of hardwood; 364,832,332 B. M. feet of spruce, hemlock and other saw-logs and boom timber; 202,832,332 B. M. feet of white pine, etc.; 27,085,654 B. M. feet red pine; 68,724,272 white pine 11 inches and under, besides large quantities of poles, pulp wood, fire wood, railway ties, pickets, shingles, pails, etc.

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Fish and Furs.—The most important fish of the inland lakes and rivers are salmon, trout, pickerel, bass, sturgeon, and whitefish. The famous "ouananiche," a gamy fresh water salmon, is found in Lake St. John. Cod, lobster, herring, and mackerel are found in the valuable coast and gulf fisheries. The resources of the province in this respect, which are very great, are as yet imperfectly known. The annual value of the catch is about \$2,000,000.

The fur trade, which was at one time the mainstay of the province, is still important; but fur-bearing animals, though still abundant, are being killed off rapidly. Moose and deer are plentiful. The bear, wolf, mink, fox, muskrat, and squirrel are found; but the beaver is becoming rare. There are large numbers of wild ducks, wild geese, and other fowl.

Agriculture and Live Stock.—Farming is the leading occupation in the fertile lowlands and valleys S. of the St. Lawrence; but N. of that river the land is generally rocky and barren, though there are fertile areas, of which the Upper Ottawa and Lake St. John districts are the best. Oats, wheat, barley, buckwheat, and rye are grown. Apples are abundant and of good quality; also plums and small fruits of many varieties. Root crops are important; but the dairy industry is the farmer's principal source of revenue. The government encourages cheese and butter production by bounties and prizes, and with excellent results, the province holding first place in cheese exports in the Dominion. In 1906 there were exported 2,258,357 boxes of cheese, valued at \$21,228,554; and 363,762 boxes of butter, valued at \$4,801,658. In 1905 there were 574 farmers' clubs and 74 agricultural societies. Agricultural lecturers are provided, and there are several experimental fruit stations. The raising of horses, cattle, sheep and swine is also important.

Manufactures and Commerce.—According to the Dominion census of 1906, which included towns and cities having a population of 1,500 and over, the value of the manufactured output of the province in 1905 was \$164,966,521, as compared with \$126,854,596 in 1900, an increase of 30 per cent. The leading articles of manufacture include leather, cloth, lumber and lumber products, cotton and woolen goods, wood pulp, iron, hardware, sugar, soap, chemicals, paper, dairy products, boots and shoes, matches, etc.

The commerce of the province depends largely upon the St. Lawrence and its tributaries. The former, by reason of the canals which overcome its rapids in the province and also the obstructions in the Great Lake system, is truly a national and continental waterway. Montreal, by reason of its situation on the St. Lawrence, is the chief Canadian port. Not only most of

the exports of Quebec, but a large share of those of Ontario and other provinces are sent by way of Montreal. The chief exports of the province are lumber, cheese, butter, beef, and fruit, chiefly apples. The imports are iron and steel manufactures, cotton and woolen goods, machinery, sugar, maize, leaf tobacco, etc. In 1906 the exports of Montreal and Quebec, which include most of the exports of the province, amounted to \$89,958,514; their imports amounted to \$85,753,109.

Railways, Canals, and Shipping.—In 1904 there were 3,510 miles of railway. Since that date the mileage has rapidly increased, owing to the construction of the Grand Trunk Pacific and Great Northern railways, which was going on in 1907. Very large sums have been contributed by both the province and the municipalities in aid of railways.

The canals of the St. Lawrence within the province include the Lachine, Beauharnois, Carillon and Grenville, Chambly, Lake St. Francis, Lake St. Louis, Rideau, and others. See article on CANALS, and section on Canals in article CANADA.

Government and Finance.—The legislative government consists of a lieutenant-governor, appointed by the governor-general in council for five years; an appointive legislative council of 24 members; and an elective legislative assembly of 74 members. The lieutenant-governor is assisted in his executive duties by a council of 7 members responsible to the legislature. The province is represented by 24 members in the Dominion Senate and 65 members in the Dominion House of Commons. The judiciary consists of the Court of King's Bench, which is also the provincial court of appeal; and the superior, circuit, and district courts. The King's Bench and superior court judges are appointed by the Dominion government. Police magistrates and justices of the peace are appointed by the provincial government.

The net public debt on June 30, 1906, was \$25,085,331, on which there was an interest charge of \$1,455,376. The total receipts for the year ending June 30, 1906, were \$12,436,734; the total expenditures, \$11,735,421. The annual financial statement or budget in the legislative assembly is made under the conditions and with a purpose which apply to those of the budgets in the other provinces.

Education and Religion.—The system of elementary education is different from that in the English-speaking provinces. Its chief officer is a superintendent of public instruction, who presides over a council of 35 members, half Roman Catholic and half Protestant, for the management of Roman Catholic and Protestant schools respectively. They are in effect separate schools, Catholic and Protestant religious instruc-

tion in them being regulated by these committees. There are, as in Ontario, local boards of trustees for individual schools, and the provincial and municipal authorities levy school taxes. In the fiscal year ending June 30, 1906, there were 6,503 schools of all classes, with an enrollment of 361,430 pupils and an average attendance of 277,983. Of these schools, 4,704 were Roman Catholic elementary, with 181,442 pupils, and 869 were Protestant elementary, with 28,960 pupils; 716 were Roman Catholic model schools and academies, with 121,215 pupils, and 75 were Protestant model schools and academies, with 10,191 pupils. There were, besides, 19 Roman Catholic classical colleges, with 6,269 pupils; and 5 normal schools.

Higher education is represented by 3 universities, with a total of 2,369 students. The universities are McGill, Montreal; Laval, Quebec, with a branch at Montreal; and the University of Bishop's College, Lennoxville. The first is a Protestant non-denominational institution, with faculties in arts, law, sciences, and medicine; Laval is the great Catholic university of the province, predominantly theological in teaching, possessing faculties of theology, arts, medicine, and law; and Bishop's College is predominantly Anglican, with faculties of arts and divinity. The leading Protestant denominations have theological colleges.

In religion Quebec is strongly Roman Catholic. According to the Dominion census of 1901 there were in the province 1,429,260 Roman Catholics, 81,563 Anglicans, 58,013 Presbyterians, 42,014 Methodists, and 8,480 Baptists.

Population and History.—In 1901 the population was 1,648,898, of whom 1,322,115 were French Canadians. At the end of the fiscal year 1910 (March 31), it was reported at 2,124,834. The principal cities are Montreal, the chief city and commercial center of Canada, and Quebec, the capital of the province, popularly known as the "Canadian Gibraltar."

The voyages of Jacques Cartier, who first ascended the St. Lawrence river in 1535, prepared the way for Samuel de Champlain (*q. v.*), who founded the city of Quebec in 1608, and established there a fur-trading post, subsequently reinforced by a few agricultural laborers. Champlain's eventful career lasted until 1635. By reason of his founding of Quebec, and also by reason of the explorations which added the upper St. Lawrence and Ottawa river country, together with the Great Lake region as far as Georgian bay, to the possessions of the French king, he is justly considered the chief pioneer of New France. He sympathized with the evangelizing efforts of the Récollet and Jesuit missionaries, and sought in every way to realize for the new

possessions the ideal of a French and Catholic monarchy. Allying himself with the Algonquin tribe, among whom his missionaries had made converts, he took the serious risk of making enemies of their opponents, the warlike Iroquois, and by so doing made a mistake which not even the resources and vigor of successors like De Tracy and Frontenac could wholly rectify. Besides, his plans were hampered by vexatious restrictions imposed from France. The fur trade became the monopoly of Richelieu's Company of the Hundred Associates, and both commercial and political initiative was denied to the colonists. The intendant, sent out by the French king as a check upon the governor, introduced an element of disturbance and was sometimes more influential than the governor. Montreal, founded by Maisonneuve in 1642, began to be a rival of Quebec; and the ecclesiastical power wielded by the masterful Laval, who became the first Bishop of Quebec in 1674, imposed a spiritual authority which was felt by the local civil and military powers alike. But a civil ruler of equal force arrived in the person of the Count de Frontenac (*q. v.*), whose energetic work (1672-98) was done at a critical time which demanded the strongest measures to save the new colony from destruction. Frontenac attacked the Iroquois with a prompt and ruthless severity that cowed them, and then, to consolidate New France in defiance of the growing power of New England, terrorized the latter by expeditions which laid waste some of the oldest settlements. Nor did he fail to stand for the rights of the colonists against the monopolists, and against undue interference by the Bishop of Quebec in civil affairs. Under Frontenac, an attack in 1690 on Quebec by the fleet of Sir William Phipps, governor of Massachusetts, was repulsed. He had given the struggling colony a firm status, but the system of government, which denied the right of public meeting or the least encouragement of self-government, nullified most of the good that he had done. Seigniorial tenure, the French system of landed estates founded on the relation of lord and vassal, did not prosper, and many of the agricultural population left the land, took to the woods, and became the first of the famous *coureurs des bois*. The fight between France and England for the control of New France went on with varying fortunes until the battle of the Plains of Abraham, on Sept. 13, 1759, decided the contest in favor of England. General Wolfe defeated the French commander, the Marquis de Montcalm, and in 1760 Montreal was captured. At that time the colony contained about 63,000 people. Quebec, Montreal, and Three Rivers were the only places of importance.

At this critical time, when a wrong and oppressive course by the British authorities

would have wrought lasting mischief, the wisdom and foresight of Sir Guy Carleton, who had carefully watched the course of affairs from 1762 to 1773, procured the passage of the Quebec Act, which guaranteed the French full possession of their civil and religious rights, while it introduced the English criminal law. The Quebec Act profoundly displeased the colonists of New England, but completely won over the French, so that they firmly resisted the attempts of the American commissioners from the Continental Congress to seduce them from their allegiance to Britain. The continued protests of the small and increasing English minority were heeded after all danger from the American Revolutionary War had passed away, and in deference to its demand for representative institutions the province was divided into Lower and Upper Canada by the Constitutional Act of 1791. The provinces were granted legislatures, but the members of the executive councils were not yet responsible to them; and there ensued an era of constitutional agitation in which ministerial accountability was the object to be attained. The War of 1812 intervened, and during the invasions of the American armies the French of Quebec, with very few exceptions, remained as firm in their British allegiance as they had been in 1775 during the campaign of generals Arnold and Montgomery. The rebellion of 1837, in which a discontented minority, under Louis Papineau (*q. v.*), took up arms in behalf of responsible government, collapsed after a brief resistance. The legislative union of Upper and Lower Canada in 1841, though it brought responsible government, left unsettled grave racial and constitutional questions, which culminated in a series of deadlocks and threatened a paralysis of government. The scheme of confederation, designed to give each province control of local and domestic affairs, then engaged the attention of leading statesmen as the only possible measure of relief; and the people approved of it. It was accomplished on July 1, 1867, Lower Canada entering it as the province of Quebec. For subsequent history see CANADA, CONFEDERATION IN.

Consult Garneau, "History of Canada"; Turcotte, "Le Canada sous l'Union"; Kingsford, "History of Canada"; Parkman, "The Old Régime," "France and England in North America," and "Wolfe and Montcalm"; Low, "Explorations and Surveys in the Interior of the Gaspé Peninsula" in "Canada Geological Survey Report of Progress" (1883); Coffin, "Province of Quebec in the Early American Revolution" in the "University of Wisconsin Bulletin" (vol. I, No. III, 1896); and Annual Departmental Reports of the Provincial Government of Quebec.

Quebec, a city of the province of Quebec,

Canada, capital of the province of Quebec. It is situated in a highly picturesque and commanding position on a promontory from 200 to 350 feet high, at the confluence of the St. Lawrence and St. Charles rivers, and on the Canadian Pacific, the Grand Trunk, the Intercolonial, the Great Northern of Canada (which is part of the Canadian Northern system), the Boston and Maine, the Central Vermont, and other railways. The city is divided into two parts: the Lower Town, built on narrow, level land between the base of the promontory and the river banks; and the Upper Town, whose older portion is surrounded by a wall, on the top of a bold, rocky bluff. It has an area of 16,000 acres, and is triangular in shape, two sides of the triangle being formed by the banks of the St. Lawrence and St. Charles rivers, and the base chiefly by the Plains of Abraham. The Upper Town is crowned by the citadel, a strong fortification covering forty acres, adjacent to Cape Diamond, which here attains an elevation of 350 feet, the highest point on the plateau. From it a remarkably fine view of the St. Lawrence and adjacent country can be obtained. On the edge of the cliffs, on the S. E. side of the city, is Dufferin terrace, at a height of 185 feet above the river, used as a public promenade and place of amusement. On the W., adjoining it, is the Governor's garden, containing the Wolfe and Montcalm monument. On the S. there has been recently laid out the new citadel walk, which leads round Cape Diamond to the Cove Fields. On the N. is the handsome Château Frontenac Hotel, built in the French baronial style of architecture, and adjoining it a fine statue of Champlain. The streets of the city are mostly narrow and irregular. The houses, usually two or three stories high, are of stone and brick, and many of them in their quaint appearance resemble those of the old provincial towns in Normandy. The Lower Town is the chief business section, along with the industrial ward of St. Roch. St. Peter street is the chief business thoroughfare; other streets containing many of the best shops are St. Joseph and Crown streets in St. Roch, and St. John, Fabrique, and Buade streets in the Upper Town.

Buildings, Institutions, etc.—The most prominent buildings are those of the provincial parliament, city hall, court house, post office, and custom house; the Roman Catholic Cathedral or Basilica; the chapel of the Franciscan convent; the Anglican Cathedral; the Church of Notre Dame des Victoires (built in 1688); Champlain market building; the drill hall, and the Auditorium.

Among the educational and charitable institutions are Laval University, the chief Catholic institution of higher education in Canada, with faculties in law, arts, theology, and medicine, and containing a fine picture gallery and museums; the Seminary

of Quebec, including Le Grand Séminaire for the education of priests and Le Petit Séminaire for the education of boys; Morrin College, a Presbyterian institution affiliated with McGill University, Montreal; the Laval Normal and Model School; Convent of the Sacred Heart; the Hôtel Dieu Convent and Hospital; the Grey Nunnery; the Ursuline Convent; General Hospital; Jeffery Hale Hospital; St. Bridget's Asylum; Orphan Asylum; Asylum for the Insane; Canadian Institute; St. Patrick's Literary Institute; the Literary and Historical Society, and other institutions. The chief parks are New Park on the Plains of Abraham (in which is the well-known monument to General Wolfe, marking the spot where he died in battle), and Victoria park, containing a fine monument to Queen Victoria. In the Esplanade, within the walls, there is also a monument to those who fell in the South African War.

Commerce, Industry, etc.—As an ocean port Quebec is connected with Europe by several steamship lines. In 1906 the imports amounted to \$9,136,774, and the exports to \$4,163,567 (provisional figures), the latter consisting chiefly of lumber, cattle, and grain. According to the Dominion census of 1906 the value of the output of manufactured articles in 1905 was \$11,388,045. The chief manufactures are woolen and cotton goods, leather, machinery, hardware, rifles, boots and shoes, nails, tobacco, etc. Ferries connect the city with Lévis, Sillery, St. Renaud, and the Isle of Orleans; and there are steamers to Montreal, Gaspé, Charlottetown (P. E. Island), Pictou (N. S.), and to the Saguenay. The city has electric street cars and electric lighting. A very large and costly railway bridge that was being constructed across the St. Lawrence, near Quebec, partially collapsed on Aug. 29, 1907, the accident precipitating scores of workmen into the river. Only a few escaped with their lives. Nearly all were residents of the United States. When completed, this bridge, a cantilever structure, will be one of the greatest in the world. The water supply of Quebec is excellent. The leading daily newspapers are the "Mercury" and "Chronicle."

History and Population.—In 1608 Champlain (*q. v.*) founded a settlement on part of the site of an Indian village named Stadacona, which Jacques Cartier had visited in 1535. Fur traders and a few agricultural laborers were the first inhabitants, and Jesuit and Récollet missionaries entered with zeal upon the work of converting the Indians. In 1629 Quebec, from the first the leading object of attack by the English colonists in America, was captured by Sir David Kirke, but was restored to France in 1632. In 1663 the population of the town numbered about 800. In 1690 and 1711 two attacks by English fleets failed, and it was

Quebec Act

not until Sept. 18, 1759, that Quebec was finally captured. The following spring the British, under General Murray, were defeated on the Plains of Abraham by 10,000 French under De Lévis, and the city was besieged until relieved by an English fleet on May 15. On Dec. 31, 1775, the Americans, under General Montgomery, made an assault on the city, but they were defeated and their commander was slain. The city was at one time the capital of Canada under the legislative union of 1841, and in 1864 the famous debate that did much to bring about confederation took place here.

Pop. (1832) 27,562; (1852) 42,052; (1871) 59,699; (1881) 62,446; (1891) 63,090; (1901) 68,840; (1909) 70,000, over 80 per cent. being Roman Catholics. In 1901 Quebec ranked third in population among the cities of Canada.

Quebec Act, an act of the English Parliament passed in 1774, providing for the government of the province of Canada, which France had ceded to Great Britain by the Treaty of Paris (1763) that ended the struggle known as the French and Indian War. The act extended the boundaries of the province by adding to it all the territory northwest of the Ohio river and east of the Mississippi. By this extension the thirteen colonies, already on the verge of revolution, and claiming the regions lying west of them, were limited by the Alleghany mountains. The act also provided for substituting the French civil law for the English as the recognized code of the enlarged province, and for the withholding of representative English institutions like those of other British provinces, an appointed council being designated for the exercise of authority. At the same time it conferred some degree of privilege on the French-speaking Roman Catholic population, to whom a partial franchise was granted. They were guaranteed freedom of public worship and confirmed in possession of their church property and revenues. While the act was passively received by the French Canadians, for whose benefit it was in some respects intended, by English-speaking people it was viewed with indignation. In the thirteen colonies it was severely denounced. It was felt as a measure directed against their aims at independence, and in fact it had some influence upon their revolutionary preparations. It is referred to in a denunciatory tone in the Declaration of Independence.

Quebracho, in botany, *Aspidosperma quebracho*, a Chilean apocynaceous tree; its bark is used as a febrifuge and in lung or bronchial diseases. It is called also white quebracho, to distinguish it from the red quebracho, a Mexican tree (*Loxopterygium lorentzii*). The bark of the latter is said to have similar properties.

Quedah, or **Kedah**, a state on the W. side of the Malay Peninsula, with an area

Queen Adelaide Archipelago

of 3,600 square miles. Pop. 30,000, nominally subject to Siam. The capital, from which the state takes its name, has about 8,000 inhabitants.

Quedlinburg, a town of Prussia, at the N. base of the Harz mountains; 56 miles S. E. of Brunswick. It was founded by Henry I., the Fowler, King of Germany, early in the tenth century, and the place is still in part surrounded by a wall flanked with towers. On an eminence overlooking the town stands the castle, the seat of the Abbey of Quedlinburg, which prior to the Reformation was the residence of abbesses who were independent princesses of the empire, and had a vote in the diet, and other privileges. The castle chapel contains monumental tombs of Henry I., his wife Matilda, and the Countess of Königsmark. Here Klopstock and Karl Ritter were born. The town has manufactures of sugar, wire goods, and farinaceous foods, and gardening is prosecuted on an extensive scale. Pop. (1900) 23,378.

Queen, a female who is chief or pre-eminent among others; one who presides; as, the queen of beauty, the queen of love, etc. In cards, a card on which a queen is depicted. In chess, the most powerful and, after the king, the most important of all the pieces in a set of chessmen. In slating, a size of slates, three feet long by two feet wide. Queen of Spain fritillary, in entomology, *Argynnis lathonia*, a beautiful butterfly. The larva feeds upon *Viola tricolor*. Queen of the meadows, in botany, *Spiraea ulmaria*, a rosaceous plant two to four feet high, with large radical and small terminal leaves, leafy stipules, small white flowers, and five to nine twisted carpels; common in meadows and by water-sides, flowering in June and July. Queen of the prairie, in botany, *Spiraea lobata*.

Queen, Walter W., an American naval officer; born in Washington, D. C., Oct. 6, 1824; was warranted midshipman Oct. 7, 1841, attached to the West India squadron, 1842-43, to the East India squadron, 1843-45, and took part in several engagements of the Mexican War, 1846-47. In the Civil War he commanded the second division of the mortar flotilla under Admiral Porter, on the Mississippi, and was with Farragut during the attack on the batteries at Vicksburg, June 28, 1862. In 1864 he participated in an engagement of Federal vessels with the Confederate ram "Albemarle." After the war he served in various positions, being promoted through successive ranks. As commodore he became a member of the retiring board in 1885, and in 1885-86 was commandant at the Washington navy yard. He was commissioned rear-admiral in 1886, and in the same year was retired. He died in Washington, D. C., Oct. 24, 1893.

Queen Adelaide Archipelago, a group of islands, belonging to Chile; N. of the W.

Queen Anne's Bounty

entrance of the Strait of Magellan; separated by Smyth Channel from King William Land on the mainland.

Queen Anne's Bounty, the name given to a fund appropriated to increase the income of the poorer clergy of England, created out of the first fruits and tenths, which before the Reformation formed part of the papal exactions from the clergy. The first fruits are the first whole year's profit of all spiritual preferments, and the tenths are one-tenth of their annual profits, both chargeable according to the ancient declared value of the benefice; but the poorer livings are now exempted from the tax. Henry VIII., on abolishing the papal authority, annexed both first fruits and tenths to the crown; and, by an act passed in 1703, these revenues were set aside, with the consent of Queen Anne, to form a perpetual fund for the augmentation of poor livings. The archbishops, bishops, deans, Speaker of the House of Commons, master of the rolls, privy councilors, lieutenants and *custodes rotulorum* of the counties, the judges, queen's sergeants-at-law, attorney and solicitor-general, advocate-general, chancellors and vice-chancellors of the two universities, lord mayor and aldermen of London, and mayors of the several cities, and by supplemental charter the officers of the Board of Green Cloth, the Queen's Council, and the four clerks of the privy council were made a corporation by the name of "The Governors of the Bounty of Queen Anne, for the Augmentation of the Maintenance of the Poor Clergy"; and to this corporation was granted the revenue of first fruits and tenths. The governors' grants consist of capital sums of \$1,000 to meet benefactions of money, land, tithes, rent charges, stipends, etc., of equal value, offered on behalf of benefices not exceeding \$1,000 in net annual income. A benefaction may be offered and a grant sought either for the augmentation of the endowment of a benefice, or toward the cost of providing or improving a parsonage house, etc. The application of the funds at the disposal of the governors is now made subject to a long series of statutory provisions.

Queen Anne's War, in American history, that part of the War of the Spanish Succession which took place in America. In 1702 the conflict here began with an unsuccessful expedition from South Carolina against the Spaniards at St. Augustine. In view of the fact that the Iroquois agreed to preserve neutrality, the French refrained from attacking New York, and New England became the chief theater of operations. The entire frontier of that section was exposed to French and Indian ravages. An attack was made at Wells, Maine, in 1703. In 1704 Deerfield, Mass., was sacked and burned, about fifty of the inhabitants were

Queen of Cities

killed, and 112 were taken into captivity. In 1708 Haverhill, Mass., suffered in the same way. British attempts against Port Royal, in Acadia, in 1704 and 1707, met with failure, but in 1710 Port Royal was captured and its name was subsequently changed to Annapolis in honor of Queen Anne. In 1711 a British fleet sailed from Boston with the object of attacking Quebec, while a land force was to march from Albany against Montreal. These movements for the conquest of Canada were unsuccessful. Eight vessels with about 1,000 men were lost in the St. Lawrence, and the campaign was given up. With this failure important operations came to an end. By the Peace of Utrecht, in 1713, the War of the Spanish Succession was brought to a close. The French gave up the territory around Hudson Bay, ceded Acadia, and surrendered all claim to Newfoundland, retaining the privilege of drying fish on the west coast. They also kept Cape Breton, which they were allowed to fortify.

Queen Bee, in entomology, a fully developed female bee in a hive or nest. She lays 2,000 or 3,000 eggs daily during the height of summer, or more than 1,000,000 during her lifetime, which is about five years. When a young queen comes forth, the old one becomes agitated with jealousy, and ultimately quits the hive, surrounded by a great multitude of workers, who found a new colony, leaving the old hive to the possession of the youthful rival. Two days to a week after coming to maturity, the young queen temporarily flies forth, and is fertilized in the air. See BEE.

Queen Charlotte Islands, a group to the N. of Vancouver Island, off the coast of British Columbia; area, 5,100 square miles. The two principal islands, Graham and Moresby, have a length of 160 and a greatest breadth of nearly 70 miles. The climate is healthy, but very rainy. Anthracite coal, copper and iron ore, and gold-bearing quartz have been found, and forests abound. The inhabitants are about 2,000 Indians, who engage in fishing. Queen Charlotte Sound is a strait separating Vancouver Island on the N. from the mainland.

Queen City of the Golden Gate, San Francisco.

Queen City of the Lakes, Buffalo, N. Y., a city of commanding position on the Great Lakes, and of much commercial importance.

Queen City, or Queen of the West, names popularly given to Cincinnati at a time when its commercial supremacy in the W. was undisputed by Chicago and St. Louis.

Queen of Cities, one of the various fanciful names given to ancient Rome.

Queen of Roads, the Appian Way, the oldest and best of all the Roman highways, has been so named. It led from Rome to Capua, and was commenced by the Decemvir, Appius Claudius, 313 B. C.

Queen of the Antilles, Cuba. It is the largest of the West Indian group, and presents the most beautiful and varied landscapes, while in fine harbors and in the great range of its vegetable products it ranks first among the islands of the Gulf of Mexico. See CUBA.

Queen of the East. (1) Antioch, a beautiful city, formerly the capital of Syria, and the place of residence of the Macedonian kings and Roman emperors. (2) Batavia, in Java, the metropolis of the Dutch East Indian possessions.

Queen of the Eastern Archipelago, the island of Java, which bears the same relation to the East Indies as the Queen of the Antilles does to the West. It is the most fertile, the most salubrious, and the most picturesque member of the Malay Archipelago, and is besides the seat of the Dutch power in the East.

Queen of the Lakes, Windermere, the largest lake in England. On its shores may be seen the most beautiful scenery in the "lake country."

Queen of the North, Edinburgh, the capital of Scotland.

Queen of the Plains, a popular name of Denver, Col.

Queen of the West. See QUEEN CITY.

Queen's College, for women, was established in London, in 1848, and incorporated by royal charter in 1853. Its Committee of Education as at first constituted included the names of Maurice, Trench, and Kingsley; of Sterndale Bennett and Hullah; of Ansted and Edward Forbes; of Mulready and Richmond. Its aim is to provide for the higher education of women, in the first place by a liberal school training, and subsequently by a six years' course of college education.

Queen's Counsel, in England barristers, and in Scotland members of the faculty of advocates, appointed council to the crown, and called within the bar. They have precedence over other barristers, and rank among themselves according to seniority. They are appointed by patent from the crown on the nomination of the lord-chancellor. They can act as judges of assize when named in the commission. It is the established etiquette of the profession that no queen's counsel conducts any case without the assistance of a junior counsel. The professional robes of queen's council are of silk instead of stuff like those of ordinary barristers; hence the phrase "to take silk." The first to be appointed to the rank of

queen's counsel was Sir Francis Bacon in 1604.

***Queensland**, a State in the Australian commonwealth; comprising the N. E. portion of Australia N. of New South Wales and E. of South Australia and its Northern Territory, being elsewhere bounded by the Gulf of Carpentaria, Torres Strait, and the Pacific. A considerable portion is thus within the tropics, the extreme N. part forming a sort of peninsula, known as York Peninsula. It has an area of about 668,497 square miles; pop. (1910) 572,654; divided into 12 large districts, namely, Moreton (East and West), Darling Downs, Burnett, Port Curtis, Maranoa, Leichhardt, Kennedy, Mitchell, Warrego, Gregory, Burke, and Cook. Most of these districts are now subdivided into counties.

Topography.—Toward the W. a large portion of the surface is dry and barren, but toward the E., and for a long stretch along the coast, boundless plains or downs, admirably adapted for sheep walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The coast is skirted by numberless islands, and at some distance is the Great Barrier Reef. The highest mountains are near the coast, the greatest elevation being about 5,400 feet. The principal rivers are the Brisbane, the Burnett, the Pioneer, the Fitzroy, and the Burdekin flowing into the Pacific, and the Flinders and Mitchell into the Gulf of Carpentaria. Some of these streams are navigable for a considerable distance inland. The coast is indented with many noble bays, affording some capacious natural harbors, which have already been brought into practical use as the outlets for the produce of the adjacent districts. The climate is healthy, and the temperature comparatively equable. The mean temperature at Brisbane is 69°, the extreme range being from 35° to 106°. In the N. part the climate is tropical. The rainfall in the interior is scanty and variable; the mean at Brisbane is about 35 inches. The indigenous animals and plants are similar to those of the rest of Australia. Crocodiles inhabit some of the N. rivers.

Productions.—There are many kinds of valuable timber trees, and a rare thing in Australia, a few good indigenous fruits. Sheep farming is the chief industry, but agriculture (including sugar-growing), cattle rearing, and mining are also important. The soil and climate are well suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar, cotton, etc. The chief products are sugar, maize, English and sweet potatoes, arrow root, and semi-tropical fruits. Sugar growing is becoming a very important industry. Gold, tin, lead, and copper are the principal minerals. The gold fields extend over an area of 15,000

*For Mad. see AUSTRALIA.

Queensland

square miles, and employ about 9,500 miners. The yield of gold as reported for the year 1898 was 920,048 ounces. The gross produce of gold in the colony from 1858 to the end of 1898 was 12,926,966 ounces. Coal and plumbago are found in large quantities; and cinnabar, antimony, and manganese are also among the mineral products. The coal measures cover about 24,000 square miles, and in 1898 the produce was 407,394 tons. In the N. pearl fishing is actively carried on. The manufactures are unimportant. The principal manufactories, or works that may be classed as such, are sugar mills, steam sawmills, soap works, agricultural implement works, and distilleries. In 1898 there were 2,742 miles of railways in operation, and 10,088 miles of telegraph line, and the telephone is coming rapidly into use.

Education and Religion.—Education is free and secular in the public schools, and is under a special department controlled by the minister for education. A Queensland university is about to be established. There is no established church, each religious denomination being entirely self-supporting.

Commerce.—The principal imports are apparel and haberdashery, cottons and woollens, flour, iron and steel, boots and shoes, tea, spirits, hardware, machinery, wine, etc.; and the principal exports, wool, gold, tin, sugar, preserved meat, cotton, wood, hides and skins. The value of the total imports in 1898 was \$30,036,330, and of the exports \$54,280,635. The staple articles of export to the United Kingdom are wool, tallow, and preserved meats. A duty of 5 per cent. is charged on imports of yarns, woven fabrics, paper, stationery, etc.; and duties at other and even higher rates on other articles. The revenue of the colony for the year 1899–1900 was \$21,942,225, and the expenditure \$21,822,100. The public debt in 1898 amounted to \$167,992,070. The first settlement of Queensland took place in 1825, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales, and was organized as a separate colony in 1859. The government of the colony is vested in a governor, who is the crown's representative, and a Parliament of two houses, the legislative council and the legislative assembly. The council consists of 39 members appointed by the crown for life, and the assembly of 72 members elected by the people for five years, and representing 60 electoral districts. The capital of the colony is Brisbane. In January, 1896, a disastrous flood caused great loss of life and property in Brisbane and Northern Queensland. Other noteworthy towns are Cooktown, Gympie,

Queenstown

Mackay, Rockhampton, Bundaberg, Warwick, etc.

Queen's Pigeon, a magnificent ground pigeon inhabiting the islands of the Indian Ocean, named after Queen Victoria. It is one of two species constituting the genus *Goura* (*G. Victoriae*), and is the largest and most beautiful species of the order.

Queen's Metal, an alloy used for making teapots, obtained by fusing under charcoal a mixture of nine parts tin, one part each antimony, lead, and bismuth.

Queen's, or King's Speech, a document prepared by the advisers (*i. e.*, the cabinet) of the sovereign and read by him or her from the throne in the House of Lords, or in his or her absence by the lord chancellor, at the opening and closing of each session of Parliament, in which, in the first case, are set forth the general relations of the empire, and the measures the ministers intend to bring forward, and, in the latter, the sovereign thanks the members of both houses for their diligent attention to business.

Queen's Tobacco Pipe, in England, the facetious designation of a peculiarly shaped kiln which used to be situated at the corner of the Tobacco Warehouses belonging to the London docks. The kiln consisted of a circular brick stalk, bulging out at the bottom to a width of five feet inside. In the interior were piled up damaged tobacco and cigars, and contraband goods, such as tobacco, cigars, tea, silk, etc., which had been smuggled, books which were attempted evasions of the Copyright Act, etc., till a sufficient quantity had accumulated, when the whole was set fire to and consumed. The total value of the goods thus destroyed was enormous; and, though this wanton destruction was often censured, the government continued till recent years periodically to fill and light the "Queen's Pipe." Seized goods are now sold at the periodical "customs sales," where unclaimed goods, samples, etc., are also disposed of.

Queenstown, a seaport of Ireland; on the S. side of Great Island; in the harbor of Cork, 12 miles S. E. of Cork and 177 S. W. of Dublin. Its original name was Cove of Cork; the present name commemorates the visit of Queen Victoria in 1849. The town is built in parallel streets on the slopes of a hill shaped like an amphitheater. It enjoys a high reputation for its mild and salubrious climate. The splendid Roman Catholic cathedral for Cloyne diocese is the principal building. Queenstown is an important port of call, the mails from the United States being landed here and sent overland by rail to Dublin; while the British mails are in part taken on board here. Its climate is good, and it is a bathing resort. Pop. (1901) 7,909.

Queen's Yellow, the yellow sub-sulphate of mercury, used as a pigment.

Queiroz, José Maria Eça de, a Portuguese novelist; born in Povia de Varzim, Portugal, Nov. 25, 1845. He studied jurisprudence in Coimbra, was editor of a paper, traveled to the Orient, and became consul successively to Havana, Bristol, and Paris, where he went in 1889. He was a naturalist of Zola's school, and introduced this style into Portugal. He was the author of "The Crime of Father Amaro" (1874); "The Mandarin"; "The Dragon's Teeth"; etc.

Quelpart, an island 60 miles off the S. coast of Korea; about 40 miles long by 17 broad. It is rock-bound and mountainous, the volcanic Mount Auckland being 6,500 feet high. It has fertile soil and good timber, and is populous.

Quenstedt, Friedrich August, a German mineralogist and geologist; born in Eisleben, Germany, July 9, 1809. Among his works are: "Epochs of Nature" (1861), "Then and Now" (1856), popular expositions of geology. He died Dec. 21, 1889, at Tübingen, where he was professor in the university.

Quental, Anthero de (ken'täl), a Portuguese lyric poet; born in Ponta-Delgada, in the island of San Miguel, one of the Azores, April 18, 1842. While yet a student in the University of Coimbra, he wrote a little volume of "Sonnets" (1861), which showed a rare command of poetical form; it was followed by "Modern Odes" (1865); "Romantic Springtides" (1871); and another volume of "Sonnets" (1881). He wrote also "Considerations on the Philosophy of Portuguese Literary History" (1872), and "General Tendencies of Philosophy in the Second Half of the 19th Century" (1892). He died in San Miguel, Sept. 11, 1891.

Quercitron, a yellow dyestuff, consisting of the shavings of the bark of *Quercus tinctoria*. Alum or stannic chloride is employed as a mordant. A finer yellow is said to be obtained when the decoction of the bark is previously boiled with dilute hydrochloric acid, owing probably to the liberation of quercetin. In the United States the bark is used for tanning.

Querétaro, a town of Mexico; capital of Querétaro State, charmingly situated on a hilly plateau, 6,273 feet above sea-level, 153 miles N. W. of Mexico City. It contains a government palace, a cathedral, an aqueduct supported in part upon arches 90 feet high, and two large cotton spinning mills, employing 2,300 hands. Here the Emperor Maximilian was shot by order of a court-martial, June 19, 1867. Pop. 34,576.

Quern, a mill, especially a hand mill for grinding corn, used before the invention of water or windmills. It consisted of two circular stones, the lower of which was slightly dished, and the upper one was pierced in the center, and revolved on a wooden or metal pin inserted in the lower. The grain was dropped with one hand into the central opening, while with the other the upper stone was revolved by means of a stick inserted in a small opening or hole near the edge.

Quesada, Gonzalo de, a Cuban diplomatist; born in Havana, Cuba, Dec. 15, 1868; was graduated at the College of the City of New York in 1888; was secretary of the Cuban revolutionary party and associated with José Martí in the struggle for Cuban independence. In 1900 he was the special commissioner of Cuba to the United States, and also to the Paris Exposition; in 1901 was a member of the Cuban Constitutional Convention and in the same year was appointed a chevalier of the Legion of Honor of France. He published "Patriotism"; "History of Free Cuba"; etc.

Quesnay, François, a French physician and economist; born near Paris, France, June 4, 1694. He was the founder of the school of economists called Physiocrats, and very influential on Adam Smith and all modern political economy. His theory was that all value is derived from the products of land, which should therefore bear all taxation, but also receive all State encouragement. He published several medical works, in addition to his more famous ones (chiefly short articles) on political economy. Among the latter the leading one is the "Tableau Économique." He died Dec. 16, 1774.

Quesnel, Pasquier, a French theologian; born in Paris, France, July 14, 1634. After a distinguished course in the Sorbonne, he entered the Congregation of the Oratory in 1657. At the age of 28 he was appointed director of the Paris house of his congregation. It was for the use of the young men under his care that he commenced the celebrated series "Moral Reflexions on the New Testament." In 1675 he published an edition of the works of Leo the Great, which in the notes was held to maintain Gallicanism, and was accordingly placed on the "Index." Having refused to subscribe the formulary condemnatory of Jansenism required by a decree of 1684 from all members of the Oratory, Quesnel was compelled to flee to the Low Countries, where he attached himself to Arnould. He continued at Brussels his "Reflexions," which were published in a complete form, with the approval of the Cardinal de Noailles, Bishop of Châlons, and ultimately Archbishop of Paris (1693-

1694). The Jesuits were unceasing in their malignant hostility, and Quesnel was denounced and flung into prison, but escaped to Holland. His book was finally condemned in 101 several propositions by the celebrated bull *Unigenitus* (1713). Quesnel spent his last years in Amsterdam, where he died Dec. 2, 1719.

Quételet, Lambert Adolphe Jacques, a Belgian statistician and astronomer; born in Ghent, Feb. 22, 1796. He was educated at the lyceum of Ghent; became Professor of Mathematics in the Athenæum of Brussels in 1819; was lecturer at the Museum of Science and Literature from 1828 to 1834, and was at the same time director of the Royal Observatory. In 1834 he was made secretary of the Brussels Academy. His principal works were "On Man and the Development of His Faculties," and "Anthropometry"; but he wrote many others. He died Feb. 17, 1874.

Quetta, known locally as SHALKOT, a town near the N. frontier of Baluchistan, strategically important as commanding the Bolan Pass and the Pishin valley. Since 1887 it has been connected with the Indian railway system, and since 1877 Quetta and its district have been administered by British officers; it is now the headquarters of the British agent in Baluchistan, and of a considerable military force, and is strongly fortified. The valley is fertile, well watered, and populous. Coal and petroleum were discovered in 1890.

Quetzalcoatl, the god of the air of the ancient Mexicans, who presided over commerce and the useful arts, and is said to have predicted the coming of the Spaniards to Mexico.

Quevedo, Vasco Mauzinho, known also as MAUZINHO QUEVEDO DE CASTELLO BRANCO, a Portuguese poet; born in Setubal, in the latter part of the 16th century. He was educated at the University of Coimbra. He wrote a history of Santa Isabel, Queen of Portugal; also "Alfonso Africano" (1611), a brilliant piece of work. He died some time after 1627.

Quevedo y Villegas, Don Francisco de, a Spanish poet and prose writer; born in Madrid, Spain, in 1580. In consequence of a duel, in which his adversary fell, he fled to Italy, where his services gained him the confidence and friendship of the Duke of Ossuna, viceroy of Naples. After having visited Germany and France, Quevedo returned to Spain, and on account of his connection with the duke, then in disgrace, he was arrested and confined to his estate, La Torre de Juan, for three years (1620-1623). After his liberation he lived for some years in retirement, occupying himself in writing political satires, burlesque poems, and

pamphlets, which obtained an extraordinary degree of success. A second long imprisonment for his satirical writings completely shattered his health, and he died soon after his liberation. His humorous productions are distinguished for playfulness, wit, and invention. His prose works are mostly effusions of humor and satire. His "Visions" (Sueños) have been translated into most European languages. He also translated the "Enchiridion" of Epictetus into Spanish. He died in 1645.

Quezal, a most beautiful Central American bird of the Trogon family (*Trogon* or *Calurus resplendens*). It is about the size of a magpie, and the male is adorned with tail feathers from 3 to 3½ feet in length, and of a gorgeous emerald color. These feathers are not strictly speaking the true tail feathers (the color of which is black and white), but are the upper tail coverts of the bird. The back, head (including the curious rounded and compressed crest), throat, and chest are of the same rich hue, the lower parts being of a brilliant scarlet. The female lacks these long feathers, and is otherwise much plainer. The food of the quezal consists chiefly of fruits. It lives in forests of tall trees. There are several allied species of birds, but none with the distinctive feature of the quezal.

Quiberon, a small fishing-town of France, in the department of Morbihan; at the extremity of a long narrow peninsula, 21 miles S. W. of Vannes. It was here that a body of French emigrant royalists landed from an English fleet in 1795, and endeavored to rouse the people of Brittany and La Vendée against the Convention, but were defeated and driven into the sea by General Hoche. Nearly all the prisoners taken were shot by order of the Convention. On Nov. 20, 1759, Hawke completely defeated a French fleet under Admiral Conflans in Quiberon Bay.

Quicherat, Etienne Joseph, a French historian; born in Paris, France, Oct. 13, 1814. His principal work is "The Trial and Condemnation and Rehabilitation of Joan of Arc" (5 vols. 1841-1849). He wrote also: "History of Costume in France" (1874); "Archæological and Historical Miscellanies" (2 vols. 1885). He died in Paris, April 8, 1882.

Quicherat, Louis, a French philologist; born in Paris, France, Oct. 12, 1799. He wrote: "Treatise on Latin Versification" (1826; 29th ed. 1882); "Elementary Treatise on Music" (1833); "Poetic Thesaurus of the Latin Language" (1836); "Latin Prosody" (1839; 32d ed. 1893); "French-Latin Dictionary" (1858). He died in Paris, Nov. 17, 1884.

Quichua, the name of a native race of South America, inhabiting Peru, parts of Ecuador, Bolivia, etc. With the Aymaras

the Quichuas composed the larger portion of the population of the empire of the Incas. The Quichua language, which was formerly the state language of the Incas, is still the chief speech of Peru, of a large portion of Bolivia, of the part of Ecuador bordering upon Peru, and of the N. section of the Argentine Republic. It is one of the most beautiful and at the same time comprehensive tongues of America.

Quick, Robert Herbert, an English clergyman; born in 1832. He was educated at Harrow and Cambridge. He took orders, held curacies in Whitechapel and Marylebone, and was appointed to the vicarage of Sedbergh in 1883, but four years later resigned the living. He had an intense love of children, and the great interest of his life was education. He wrote: "Essays on Educational Reformers" (1868). He died in Cambridge, England, March 9, 1891.

Quicklime, lime in a caustic state; calcium oxide deprived by heat of its carbon dioxide and water. This is extensively done in lime kilns, the fuel used being fagots, brushwood, or coal. The firewood and lime to be calcined are mixed. Quicklime treated with water evolves much heat, and falls into a thick paste. Lime thus slaked and mixed with sand constitutes mortar.

Quicksand, in its usual significance, a tract of sand which, without differing much in appearance from the shore of which it forms part, remains permanently saturated with water to such an extent that it cannot support any weight. Quicksands are most often found near the mouths of large rivers. They appear only to be formed on flat shores, the substratum of which is an irregular expanse of stiff clay or other impervious formation. Pools of water are retained in the hollows, and become partially filled with sand or mud, which remains like the soft sediment in a cup of cocoa on account of the absence of drainage. The sand on a uniform shelving shore consolidates at low tide because the water which permeates it drains back freely to the sea. In narrow channels through which the configuration of the adjoining shore causes strong tidal currents to run the sand may be kept so constantly stirred up by the moving water that a quicksand results. Thus, while the summit of a sandbank rising from a gentle slope is usually firm, the hollow margin of the bank where it meets the shore is frequently a quicksand.

Quicksand, when examined under the microscope, will be seen to have rounded corners like river sand, as distinguished from angular or "sharp" sand, which will pack more solidly than the other. It is quicksand that is used in the hour-glass and in the smaller egg-boiler, partly because of its fineness and partly because it does not obscure the inner surface of the glass by

scratching. A cubic foot of this dry sand weighs about 94 pounds. This, for sand, is a very light weight, for there are other qualities of sand which weigh as much as 171 pounds. The lightness of quicksand is the quality which will lead us more surely to the cause of its reputation; and this may be illustrated by a bucketful of sand loaded with water from below and made to overflow very slowly. The upward current will be found to loosen the sand and to raise the surface very slightly, separating and lubricating the particles so that they are easily displaced. The bucket now contains quicksand, and this sand from the support it receives from the water has its weight reduced. In the dry state it weighed nearly 94 pounds, but if weighed in the water it is reduced to 32½ pounds, and its mobility prevents any animal from walking on it. The mixture of sand and water weighs quite 112 pounds per cubic foot, or nearly twice the weight of water, and, bulk for bulk, nearly twice the weight of a man, but it is too thick to swim in, and the person engulfed in it would soon be too exhausted to escape. Quicksands require in all cases an upward current which is not quick enough to form what is called a spring or fountain. Any sand and almost any material might have the quality of quicksand imparted to it by a suitable current.

Quicksands are not commonly of great extent, and their danger has probably been exaggerated in the popular mind by sensational descriptions in works of fiction—*e. g.*, in the "Bride of Lammermoor" and Wilkie Collins' "Moonstone." Persons sink in a quicksand exactly as in water, only more slowly; and it is probable that if the victim did not struggle he would not sink over the head, as experiments show that water containing a quantity of solid matter in suspension has its floating powers increased. It is a common belief among sailors that if a vessel is stranded on a quicksand it is inevitably sucked down. This cannot be the case unless the vessel springs a leak, or heels over sufficiently to let the semi-liquid sand enter. The idea may have taken rise from the popular association of quicksands with whirlpools, or from the fate of small vessels stranded at low tide on a stiff bank of clay which held them fast and allowed the rising tide to submerge them. The name quicksand is sometimes applied to the drifting sands which are carried by wind over cultivated land bordering the seashore or a desert.

Quicksilver. See MERCURY.

Quids, a name given to the few supporters of John Randolph when he seceded from the Republican party in 1805. The Latin phrase *tertium quid*, a "third something" (as distinguished from the two powerful parties), gave rise to the name.

Quietism, the doctrine that the essence of true religion consists in the withdrawal of the soul from external and finite objects, and its quiet concentration upon God. It is a form of mysticism, and has been held by individuals in the Church in all ages. In the 14th century it attracted notice in connection with the Hesychasts (see HESYCHAST). The term was specially used to describe the views advocated by Miguel de Molinos, a Spanish priest, who settled at Rome in 1669 and 1670, under the patronage of Cardinal Odeschalchi, afterward Innocent XI. In 1676 he published his "Spiritual Guide," which was soon afterward translated into Italian, French, Latin, and English. On Aug. 28, 1687, the Inquisition condemned 68 propositions in his writings, and on Nov. 20 he was imprisoned for life, and died Dec. 28, 1697. Among his followers was a Barnabite, François de la Combe, who instructed Madame Guyon. In 1694 a commission, with Bossuet, Bishop of Meaux, at its head, condemned 30 errors in her writings. She was defended by Fénelon, Bishop of Cambray, whose writings in turn were condemned in 1699 by Pope Innocent XII., and retracted by their author. It was believed that the Quietist doctrine tended to disparage the external observances of religion and substitute the authority of the individual for that of the Church. In another direction, also, quietism in some cases tends to antinomianism. See FAMILY OF LOVE.

Quileute, a tribe of North American Indians, who formerly lived on a river of the same name, in the State of Washington. Their numbers were gradually reduced by wars with other tribes and the few remaining are found in the Neah Bay reservation in Washington.

Quilimane, a seaport of East Africa, in the Portuguese territory of Mozambique, about 15 miles from the mouth of the river of the same name, the N. arm or the Zambesi delta. The town occupies an unhealthy site, but imports cottons, beads, hardware, arms, coal, spirits, and foodstuffs to the annual value of about \$350,000, and exports ivory, ground nuts, india-rubber, wax, copal, and oil-seeds.

Quill, or **Quille**, in ornithology, the larger and stronger feathers of the wing. They are of three kinds: primaries, secondaries, and tertiaries. In music, a small piece of quill attached to a piece of wood, by means of which certain stringed instruments, as the virginal, were played. In seal engraving, the hollow mandrel of the lathe or engine used by the seal engraver. In weaving, a small spindle, pirn, or rod upon which thread is wound to supply the shuttle with the woof, weft, or filling, as it is variously called, and which crosses the warp, or chain.

Quillaia, **Quillaja**, or **Quillaya**, the typical genus of *Quillaia*. Large evergreen trees, with undivided leaves, five petals, 10 stamens, and five single-celled ovaries. Three or four species are known; all from South America. *Q. saponaria* is the Quillai or Cullay. Also, the bark of the *Q. saponaria*. It is used as a source of saponin, which is extracted with alcohol. Its aqueous infusion is used for washing, and giving a head to stale beer.

Quiller=Couch, **Arthur Thomas**, an English writer of fiction; born in Cornwall, Nov. 21, 1863. He was educated at Oxford. He belonged to the staff of the weekly "Speaker." Among his stories are: "Dead Man's Rock"; "The Astonishing History of Troy Town"; "The Splendid Spur"; "The Blue Pavilions"; "The Delectable Duchy"; "The Ship of Stars," etc. He also completed ARTHUR T. QUILLER-COUCH. Robert Louis Stevenson's unfinished novel, "St. Ives."



Quillet, **Claude**, known also as CALVIDIUS LÆTUS, a French physician and poet; born in Touraine, in 1602. He went to Rome and lived there till after the death of Richelieu. His chief work was "Callipædia," written in Latin and satirizing Mazarin; but on account of the latter's kindness, the satire was changed to eulogy in a second edition. He died in 1661.

Quilon, a town of Southern India, in the State Travancore; on the W. coast, 85 miles N. W. of Cape Comorin. A settlement of the ancient Syrian Church and subsequently of the St. Thomas Christians, it was, under the names Cilon and Columbum, a famous mart for the trade in timber, ginger, pepper, etc. The Portuguese built a fort there in 1503, which the Dutch took in 1653. From 1803 to 1830 it was garrisoned by the British. Pop. 13,588.

Quiloa, or **Kilwa**, a seaport of East Africa, in German territory, 190 miles S. of Zanzibar, and an outlet for the trade with Nyassaland, exports ivory, gum copal, rice, and manioc. Pop. 10,000.

Quilting, a method of sewing two pieces of silk, linen, or stuff on each other, with wool or cotton between them, by working them all over in the form of chequer or diamond work, or in flowers.

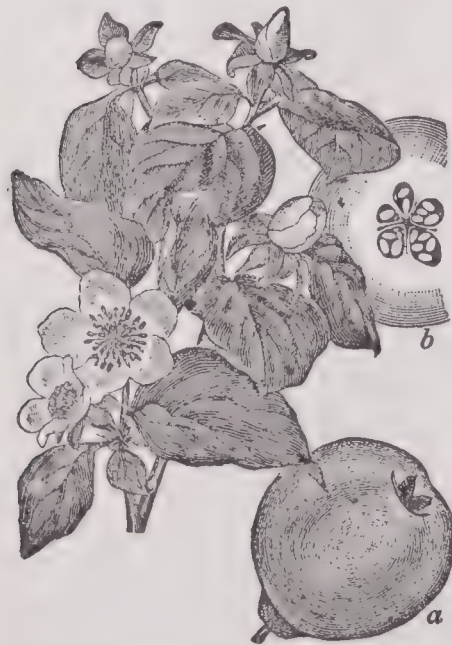
Quimper

Quimper, a town of France, in the department of Finistère; on the Odet, 11 miles from its mouth, and 63 miles S. E. of Brest. Its cathedral (1239-1515), a stately and richly-carved and ornamented edifice, is the principal building; there are also a college, a museum, and an agricultural school. Potteries are in operation, as well as tanyards, sailworks, etc.; and fishing is carried on.

Quin, James, an English actor, of Irish parentage; born in London, England, Feb. 24, 1693. He made his first appearance on the stage at Dublin in 1714; shortly afterward he obtained an engagement in London, and gradually acquired celebrity as a tragic actor as well as in characters of comic and sarcastic humor, like Falstaff, Volpone, etc. He retained his preëminence till the appearance of Garrick in 1741. His last performance was Falstaff (1753), in which character he is supposed never to have been excelled. He spent his latter years at Bath, where his fund of anecdote and pointed wit made him much sought after, and where he died Jan. 21, 1766.

Quinault, Philippe, a French dramatist; born in Paris, France, June 3, 1635. His first play was produced at 18, and was successful. He studied law and continued writing at the same time. He obtained a literary pension, and was made a member of the Academy in 1670. He was a prolific writer, producing comedies, tragedies, and finally libretti for Lulli's operas. It was in the latter work that he made his name. Among his chief works are: "The Coquet Mother," a comedy; and "Armide," a romantic opera.

Quince, the fruit of *Cydonia vulgaris*, or the tree itself. It is 15 or 20 feet high, with white or pale-red flowers, and ultimately golden fruit.



FLOWERING BRANCH OF
QUINCE.

(*Cydonia vulgaris*):
a, ripe fruit; b, section of ripe fruit.
The Japan quince (formerly *Pyrus*) *japonica*, is a small tree about six feet high, with oval,

It is indigenous in the S. of Europe, the N. of Africa, the Himalayas, etc. The fruit is too austere to be eaten uncooked, but is used in the preparation of marmalade, jelly, and preserves. Its mucilaginous seeds are demulcent, and given by the natives of India in diarrhoea, dysentery, sore throat, and fever.

Quincy

crenately serrated leaves, and fine red flowers.

Quincunx, in ordinary language, an arrangement of five things in a square, one at each corner and one in the middle; especially applied to a plantation of trees so arranged. In astronomy, the position of planets when distant from each other five signs or 150°. In botany, quincuncial aestivation.

Quincy, a city and county-seat of Adams co., Ill.; on the Mississippi river, and on the Wabash, the Burlington Route, and the Quincy, Omaha, and Kansas City railroads; 104 miles W. of Springfield. Here are the St. Francis Solanus College (R. C.), Chad-dock College (M. E.), Gem City and Union business colleges, St. Mary's Institute (R. C.), Philbrick shorthand school, public library, Blessing and St. Mary's Hospitals, State Soldiers' and Sailors' Home, residence of a Protestant Episcopal bishop, water-works, street railroad and electric light plants, National, State, and private banks, and several daily and weekly periodicals. There is daily steamboat connection with cities along the Mississippi river. Quincy has flouring mills, carriage factories, machine shops, foundries, saw mills, planing mills, and extensive manufactures of beer, cigars, tobacco, sash, blinds, stoves, furniture, bricks, steam engines, liquor, plows, etc., and an assessed property valuation of nearly \$5,000,000. A magnificent railroad bridge crosses the river here. Pop. (1890) 31,494; (1900) 36,252; (1910) 36,587.

Quincy, a city in Norfolk co., Mass.; at the mouth of the Quincy river where it enters Quincy Bay, and on the New York, New Haven, and Hartford railroad; 8 miles S. E. of Boston. It comprises nearly a dozen villages. Here are the Adams Academy for Boys, Woodward Institute for Girls, Thomas Crane Public Library, city hospital, waterworks, electric street railroads, electric lights, National, coöperative, and savings banks, and daily and weekly newspapers. The city contains quarries of the celebrated Quincy granite, which is shipped to nearly all parts of the United States. It also has a large boot and shoe industry, and an assessed property valuation of about \$20,000,000. Quincy is noted as the birthplace of John Hancock, of John Adams, second President of the United States, and of his son, John Quincy Adams. Pop. (1900) 23,899; (1910) 32,642.

Quincy, Edmund, an American writer, son of Josiah; born in Boston, Mass., Feb. 1, 1808. He wrote a "Biography" of his father (1867), and edited his speeches (1875), together with some works of his own. He died May 17, 1877.

Quincy, Josiah, sometimes called JOSIAH QUINCY, JR., an American lawyer; born in Boston, Mass., Jan. 23, 1744. He

Quincy

graduated from Harvard in 1763. Though noted as a patriot, he joined with John Adams in defending the British soldiers in the Boston Massacre case. But he took part in the town meeting ordering the "Boston tea-party"; and in September, 1774, went to England to speak in behalf of the colonists. His best-known works are: "An Address of the Merchants, Traders, and Freeholders of Boston" in favor of a non-importation act (1770), and "Observations on the Boston Port Bill" (1774). He died April 26, 1775.

Quincy, Josiah, an American author and orator; born in Boston, Mass., Feb. 4, 1772, son of Josiah Quincy. He was graduated at Harvard College in 1790, studied law, and entered Congress in 1805, where he distinguished himself as a favorite orator in opposition to the policy of Jefferson and Madison, and was one of the earliest to denounce slavery, declaring that the purchase of Louisiana was a sufficient cause for the dissolution of the Union. In 1813 he declined a reelection, and devoted his attention to scientific agriculture. He became, however, a member of the Senate of Massachusetts, and in 1822, judge of the Municipal Court of Boston. In 1823, he was elected mayor of Boston; and in 1829 accepted the post of president of Harvard College, which he held till 1845. Among his published works are a "Memoir of his Father," 1825; "History of Harvard University," 1840; "History of the Boston Athenæum," 1851; "The Municipal History of the Town and City of Boston," 1852; "Life of John Quincy Adams," 1858; "Essays on the Soiling of Cattle," 1859. He died in Quincy, Mass., July 1, 1864.

Quinet, Edgar, a French historian and philosopher; born near Bourg, France, Feb. 17, 1803. His works fill nearly 30 volumes,



EDGAR QUINET.

of which only a small part has any permanent value, as he is vague and undetermined, in spite of his real learning and ability. He went to Greece on a government mission, and was made Professor of Foreign Literatures at Lyons, and afterward at the Collège de France in Paris. He was on the staff of

the "Revue des Deux Mondes," and received the cross of the Legion of Honor in 1838.

Quinoa

His principles were strongly republican, and brought him into trouble more than once. His leading works are: "Ahasuerus" (1834); "Merlin the Enchanter" (1861); "The Revolution" (1865); and "The Creation" (1869). He also wrote several long poems, of which perhaps "The Slaves" (1853) is the best. He died in Versailles, March 27, 1875.

Quinine, in chemistry, $C_{20}H_{24}N_2O_2$, chinin or quinia; the most important alkaloid of the true cinchona barks, first obtained, but in an impure state, by Gomez, of Lisbon, in 1811. It is permanent in the air, inodorous, and very bitter; almost insoluble in water, but soluble in absolute alcohol, ether, and chloroform. From its alcoholic solution it crystallizes in prisms, having the composition $C_{20}H_{24}N_2O_2 + 3H_2O$, and fusing at 75° . It exerts a strong laevorotary action on polarized light, and is a powerful base, neutralizing acids completely, and forming easily crystallizable salts, which are very bitter and less soluble in water than the salts of the other cinchona alkaloids. Solutions of quinine in dilute sulphuric acid exhibit a blue fluorescence, and this is observable in solutions containing much less than one part in 200,000 parts of water.

Quinine Sulphates, the neutral or common medicinal sulphate, $2C_{20}H_{24}N_2O_2 \cdot H_2SO_4 + 8H_2O$; prepared by neutralizing quinine with dilute sulphuric acid. It crystallizes in long flexible monoclinic needles, having a nacreous aspect, almost insoluble in cold water, but soluble in boiling water, in alcohol, and in dilute sulphuric acid; insoluble in ether, chloroform, and petroleum spirit. The solution of quinine sulphate in water, acidulated with sulphuric acid, exhibits a powerful blue fluorescence, and turns the plane of polarization of a ray of light strongly to the left $(\alpha)_D^{25} = 255.6$. In commerce it is frequently found mixed with cinchonidine or cinchonine. This may be due either to actual adulteration, or to an imperfect mode of preparation. The acid salt of soluble sulphate, $C_{20}H_{24}N_2O_2 \cdot H_2SO_4 + 7H_2O$, separates from a solution of quinine in excess of sulphuric acid. It crystallizes in rectangular prisms, soluble in water and in alcohol. Quinine sulphate is largely employed as a febrifuge and tonic, and it possesses powerful antiseptic properties.

Quinoa, *Chenopodium Quinoa*, a valuable food-plant, a native of Chile and the high table-land of Mexico, which much resembles some of the British species of *Chenopodium*. In the countries in which it is indigenous it is much cultivated for its seeds, which form a principal food of the inhabitants. The meal made from some varieties of the seed has a somewhat peculiar flavor, but it is very nutritious and is made into a kind of porridge and cakes. The plant is sometimes cultivated in British gardens for

its leaves, which are a good substitute for spinach.

Quinoline, a pungent colorless liquid obtained by the distillation of bones, coal tar, and various alkaloids. It is the base of many organic bodies, and is isomeric with leucol.

Quinquagesima Sunday, the Sunday next before Lent, being about 50 days before Easter.

Quinquennial Prescription, a period of five years allowed by the law of Scotland within which payment of sums on all bargains concerning movables, arrears of rent in some leases, multures, ministers' stipends, arrestments, must be enforced.

Quinqueremes, vessels with five banks of oars, however arranged; may be regarded as the first-rates of the ancient navies.

Quinsy, or **Quinancy**, inflammatory sore throat. There is swelling of one tonsil, or of both, attended with difficulty of breathing and swallowing, and febrile symptoms. Quinsy has, though rarely, proved fatal by producing suffocation, but it generally terminates favorably by resolution or suppuration. In the latter case a good deal of purulent matter is discharged, and the patient is immediately relieved.

Quintain, a figure or object to be tilted at; a favorite English sport in the Middle Ages. It consisted of an upright post, on the top of which a cross post turned upon a pin; at one end of the cross post was a broad board, and at the other a heavy sandbag; the play was to ride against the broad end with a lance, and pass by before the sandbag, coming round, should strike the tilter.

Quintal, a weight of 100 or 112 pounds, according to the scale used. The French *quintal metrique* is 100 kilograms or 220.46 pounds avoirdupois.

Quintilian, **Quintilianus Marcus Fabius**, a Roman rhetorician; native of Spain. In his early youth he was at Rome, and heard the lectures of Domitius Afer, who died A. D. 59. He accompanied Gabba to Rome, in the year 68, became an eminent pleader, and still more eminent as a teacher of rhetoric. He taught at Rome for 20 years, was named preceptor to the grand-nephews of Domitian, had also Pliny the younger among his scholars, and had a salary from the public exchequer. He retired from his public duties in 89, and is supposed to have lived about 30 years longer. His great work is entitled, "On Oratory as an Art," and was written after his retirement, but during the reign of Domitian. It is the most complete course of rhetoric handed down from ancient times, and is distinguished for its elegance of style, as well as for sound judgment, cultivated taste, and various knowledge. The first complete copy of this work was discovered

by Poggio, in the abbey of St. Gall, about 1419, and the first printed edition appeared at Rome, in 1470.

Quintilius, Aurelius Claudius, brother of Claudius II., was, on his death, invested with the purple by the army in Aquitaine, A. D. 270, but being deserted by his troops on the approach of the rival Emperor Aurelian, who had been proclaimed by the Italian army, he bled himself to death in a bath 17 days after assuming the scepter.

Quirinal, The, one of the seven hills of ancient Rome, and next to the Palatine and Capitoline, the oldest and most famous quarter of the city.

Quirinus, among the Romans, a surname of Romulus after he had been raised to the rank of a divinity. Hence Quirinalia, a festival in honor of Romulus, held annually on the 13th day before the Kalends of March, that is, Feb. 17.

Quirites, a designation of the citizens of ancient Rome as in their civil capacity. The name of Quirites belonged to them in addition to that of Romani, the latter designation applying to them in their political and military capacity.

Quirk, in architecture and carpentry: (1) A sudden turn; applied to a form of molding in which an acute recess separates the molding proper from the fillet or soffit. It is much used between moldings in Gothic architecture; in Grecian, and sometimes in Roman, architecture ovolos and ogees are usually quirked at the top. (2) A projecting fillet on the sole or side of a grooving plane, which acts as a fence or a gauge for depth or distance. (3) A piece taken out of any regular ground-plot or floor, so as to make a court, yard, etc.; thus, if the ground plan were square or oblong, and a piece were taken out of the corner, such piece is called a quirk.

Quirk Molding, a molding whose sharp and sudden return from its extreme projection to the reëntrant angle partakes rather of a straight line on the profile than of the curve.

Quita, Domingo dos Reis (kē'tä), a Portuguese poet; born in Lisbon, Jan. 8, 1728; was left at his father's death the oldest of seven children, and was apprenticed to a barber, but pursued by himself the study of Portuguese literature and that of other countries. The money gained by his writings was lost in the Lisbon earthquake. His most famous work is "Inez de Castro," besides which he wrote four other dramas and many poems. He died in 1770.

Quit and Goal, two terms introduced by Prof. H. A. Newton, of Yale University, to define the two points opposite each other in the heavens toward one of which the earth is at the time moving in its orbit round the sun and from the other receding. They are of great convenience as brief and

Quit=claim

concise expressions in the discussions of meteors, and they are equally applicable to all discussions of motions in space. See METEORS; SOLAR SYSYTEM.

Quit=claim, a deed of release; an instrument by which some claim, right, or title, real or supposed, to an estate, is relinquished to another without any covenant or warranty, express or implied.

Quitman, John Anthony, an American military officer; born in Rhinebeck, New York, Sept. 1, 1799. He began his career by teaching school from his 16th to his 19th year, when he commenced the study of law. Removing to Mississippi in 1821, he entered the political arena, filling successively the offices of member of the Legislature, State chancellor, member of the convention for revising the State constitution, State Senator, and governor, which latter he entered on through a vacancy in 1836. He soon after withdrew from political life, and joined the Texans in their struggle for independence. In 1846, he was appointed Brigadier-General of the United States army in the war with Mexico, distinguishing himself at Monterey, Vera Cruz, and Cerro Gordo, after which latter engagement he was brevetted Major-General, and was voted a sword by Congress for gallantry. He participated in the attack on Chapultepec, and was foremost in the assault on the City of Mexico, which city he governed till order was established. He was elected governor of Mississippi soon afterward, but resigned in consequence of accusations of complicity with the Lopez-Cuban expedition, of which charge, however, he was acquitted. In 1855 and 1857, he was elected to Congress by large majorities. He died in Natchez, Miss., July 17, 1858.

Quito, a city and capital of the republic of Ecuador; on the E. slope of the W. branch of the equatorial Andes; 150 miles from Guayaquil. The volcanic mountain of Pichincha is the basis on which it rests; and owing to the inequalities of the ground, the streets are very irregular and uneven. On one side of the principal square stands the cathedral, and on the opposite the episcopal palace; the third side is taken up with the town house, and the fourth by the palace of the Audience. It is very spacious, and has in the center an elegant fountain. In these the greatest part of the convents are situate, and make a handsome appearance. Manufactures include coarse cotton and woollen goods, hosiery, lace, jewelry, and confectionery. It has a trade in agricultural produce, and exports iron, steel, and indigo. The great danger of Quito is from earthquakes, and from the vicinity of burning mountains, which often break out into the most tremendous eruptions. On Feb. 4, 1797, 40,000 lives were lost. Since this period violent shocks of earthquake have been frequently experienced. The height of

Quo Warranto

Quito above the level of the sea is 9,534 feet. Eleven summits of mountains capped with snow are to be seen from it. Pop. 80,000.

Quit=rent, rent paid by the freeholders and copyholders of a manor in discharge or acquittance of other services.

Quoin, a wedge-shaped block. Specifically, in gunnery, a wedge-shaped block of wood, having a handle inserted in its thicker extremity; used in some cases for giving the proper elevation to mortars, howitzers, and naval guns. In printing, one of the wedges by which the pages or columns of type are locked in a chase, ready for printing. Nautically, a wedge used as a chock in stowing casks, to prevent rolling. In masonry, an external angle of a wall; particularly an ashlar or brick corner projecting beyond the general faces of the walls which meet at the angle. Rustic quoins are rusticated ashlars forming external projecting corners, the remainder of the wall being of ordinary masonry, rubble, or brick, with occasional piers of masonry.

Quoits, a game played with a flattish ring of iron, generally from 8¼ to 9½ inches in external diameter, and between one and two inches in breadth. It is convex on the upper side and slightly concave on the under side, so that the outer edge curves downward, and is sharp enough to cut into soft ground. The game is played in the following manner: Two pins, called hobs, are driven into the ground from 18 to 24 yards apart; and the players, who are divided into two sides, stand beside one hob, and in regular succession throw their quoits (of which each player has two) as near the other hob as they can, giving the quoit an upward and forward pitch with the hand and arm, and at same time communicating to it a whirling motion so as to make it cut into the ground. The side which has the quoit nearest the hob counts a point toward game, or if the quoit is thrown over the hob, it counts two.

Quorra. See NIGER.

Quorum, in Old English law, those justices of the peace whose presence is necessary to constitute a bench. All justices are now generally of the quorum, but formerly some justices, eminent for learning or prudence, were specially named as justices of the quorum. Also such a number of officers or members of a body as is competent by law or constitution to transact business.

Quot, in Scotch law, one-twentieth part of the movable estate of a person dying in Scotland, anciently due to the bishop of the diocese in which he resided.

Quo Warranto, in law, a writ issuing against any person or corporation that usurps any office or franchise, to inquire by what authority he or it supports his or its claim, in order to determine the right.



R, the 18th letter and the 14th consonant of the English language, is classed as a semi-vowel and a liquid. It is also called a trill. It is generally considered to have two sounds: The first, when it begins a word or syllable, and when it is preceded by a consonant, being then produced by an expulsion of vocalized breath, the tongue almost touching the palate or gum near the front teeth, with a greater or less tremulous motion, as in *ran*, *tree*, *morose*, etc.; the second, less decidedly consonantal, heard at the end of words and syllables, and when it is followed by a consonant, being formed by a vibration of the lower part of the tongue, near the root, against the soft palate, as in *her*, *star*, *beard*, etc. With many English speakers *r* when followed by a consonant at the end of a syllable is scarcely heard as a separate, distinct sound, but has merely the effect of lengthening the preceding vowel, becoming in such cases a vowel, rather than a consonant. In Scotch and some dialects, *r* has always the same sound, being uttered with a strong vibration of the tongue, but less guttural than in French or German. By the Romans *r* was called the "dogs' letter," from its sound resembling the snarling of dogs. In words derived from the Greek we follow the custom of the Romans, who represented the aspirated sound with which *r* was pronounced by the Greeks, by *rh*, as in *rhapsody*, *rhetoric*, etc. In such words, however, the *h* has no influence on the pronunciation of the English word, and is, therefore, entirely superfluous. *R* and *l* are frequently interchanged (see remarks under *L*). They also sometimes change places. *R* sometimes represents a more original *s*, as in *ear* = Gothic *auso*; *iron* = Old English *isen*, *iren* = Gothic *isarn*. It has disappeared from some words, as *speak* = Anglo-Saxon *spræcan*; *pin* = Anglo-Saxon *preon*; *palsy* = Middle English *parlesie*, French *paralysie*, Greek *paralysis*; *cockade* = Old French *cocart*, etc. *R* has intruded itself into several words to which it does not properly belong, as *groom* (bridegroom) = Anglo-Saxon *guma*; *hoarse*

= Anglo-Saxon *hos*; *partridge* = French *perdrix*, Latin *predix*; *cartridge* = French *cartouche*; *culprit*, from Latin *culpa*; *corporal* = French *caporal*. In *celery* it represents an original *n*, Greek *selinon*.

As an initial, *R* represents the Latin *rex* = king, as *George R.* = *George, king*; or *regina* = queen, as *Victoria R.* = *Victoria, queen*. It also represents English royal, as *R. N.* = *Royal Navy*, *R. A.* = *Royal Artillery*. In astronomy it stands for right, as *R. A.* = *Right Ascension*; in proper names, for *Richard*, *Robert*, etc.; in monumental inscriptions, for *requiescat*, as *R. I. P.* = *requiescat in pace* = may he (or she) rest in peace; in Biblical literature for revised, as *R. V.* = *revised version*. As a symbol, *R* was formerly used to stand for 80, and with a dash over it, for 80,000. In medicine, *R* stands for Latin *recipe* = take. The three *R*'s, a humorous and familiar designation for the three elementary subjects of education: reading, writing, and arithmetic. It originated with Sir W. Curtis.

Ra (more properly *Rê*), the name of the god of the sun among the ancient Egyptians. He is represented, like *Horus*, with the head of a hawk, and bearing the disk of the sun on his head.

Raasay, one of the Inner Hebrides, lies between the Isle of Skye and the mainland of Scotland, and belongs to Inverness-shire. It is 13 miles in length from N. to S., $3\frac{1}{2}$ miles in greatest breadth, and 24 square miles in area. The W. side of the island is bare and uninteresting. On the E. and more sheltered side there is some striking scenery. *Dun Caan* (1,456 feet) is the highest point, and *Brochel Castle*, on the E. shore—now a mere ruin—the chief object of interest.

Rabat, or **New Sallee**, a seaport of Morocco, and one of the most picturesque towns of the empire; on the S. side of the *Bu-Ragreb*, at its entrance into the Atlantic. It stands on cliffs in the midst of gardens, and is overlooked by a large citadel. The most conspicuous object is, however, the tower of *Beni-Hassan* (180 feet high), rivaling the great towers of *Seville* (*Giralda*) and *Morocco* (*Kutubiya*); near it is the ruined mosque of *Almanzor*, originally in-

Rabbet

tended to be made the largest in the world. Ruins still exist of the sultan's palace that was immortalized by the feats of Dick Whittington's cat. Carpets, shoes, and mats are made, and woollens dyed. But, owing to the silting up of the mouth of the river, the commerce of Rabat has much declined. Formerly it was the center of the European trade with Morocco; it still exports olive oil, grain, hides, flax, wool, maize, and millet. There is a small import of cotton stuffs, sugar, candles, and tea. Pop. 26,000.

Rabbet, to cut the edge of, as of a board, in a sloping manner, so that it may form a joint with another board similarly cut, by lapping; also to cut a rectangular groove or recess longitudinally in the edge of, as a board, timber, or the like, to receive a corresponding projection upon the edge of another board, etc., so as to form a joint. Also to lap and unite the edges of, as boards, etc., by a rabbet.

Rabbi, in Jewish history and literature, *rabbi* (Hebrew *rabbi*, Greek *rabbi*) is the noun *Rab* with the pronominal suffix, and in Biblical Hebrew = great man, distinguished for age, rank, office, or skill (Job xxxii: 9; Dan. i: 3; Prov. xxvi: 10), where, however, it only occurs without the suffix. In post-Biblical Hebrew it is used as a title indicating sundry degrees by its several terminations. Thus, the simple term *Rab* = teacher, master, and was the title which Babylonian Jews gave to a doctor of the law. *Rabbi* (= my master), which is the same with the pronominal suffix first person singular, is the Palestinian title, and is the one so frequently given to Christ (Matt. xxiii: 7, 8; xxvi: 25, 49, etc.). *Rabbon*, which is the same term with the pronominal suffix first person plural (= our teacher, our master), is the Aramaic form of it, and is the highest degree. This form, however, is also used as a noun absolute, the plural of which is *Rabbonian* and *Rabbonim*, *Rabboni* = our master, the title given to Christ in Mark, which is spelled *Rabbouni* in John xx: 16, is the form of the title with the suffix first person plural. This title was conferred when three authorized Rabbins called a student *Rabbi*, which invested him with the right to administer the penal law.

Rabbinic Hebrew, that form of Hebrew in which the Jewish scholars and theologians of the Middle Ages composed their works. Grammatically it differs but little from the ancient Hebrew, but in many cases new meanings are attached to Hebrew words already in use, in other cases new derivatives are formed from old Hebrew roots, and many words are borrowed from the Arabic. The rabbinical literature is rich and well repays study.

Rabbit, the *Lepus cuniculus*, a well-known burrowing rodent, with a very wide

Rabelais

geographical range. It probably had its home in the W. portion of the Mediterranean basin, but has spread over Western Europe, Great Britain, Ireland, Australia, New Zealand, and America. The rabbit is smaller than the hare; its muzzle is slenderer, and the palate larger and narrower. The ears and feet are shorter, the former with a smaller black tip (in some cases it is entirely absent), and the general color is grayer. They begin to breed at six months old, and have several litters in each year. The young — usually from five to eight in number — are born blind and naked, and are produced in a separate burrow. Domesticated rabbits have been greatly modified by the skill of the breeder; they have increased in size and vary in color, albinos being very common, and forming a separate race. Rabbits form an important article of food.

Rabelais, François, a French satirist; born in Chinon, Touraine, about 1483. He was at first a monk, but in consequence of



FRANÇOIS RABELAIS.

having been punished for some indecorous behavior, he quitted the Benedictine order, studied medicine at Montpellier, and for a time practised as a physician. He subsequently obtained, through the influence of his patron, Cardinal du Bellay, whom he accompanied to the court of Rome, the rectory of Meudon. He was author of several books; but the only one by which he is known is the romance called "The Lives, Heroic Deeds, and Sayings of Gargantua and Pantagruel," an extravagant satire upon monks, priests, Popes, and pedants, in which much obscenity and absurdity are blended with learning, wit, and humor. Rabelais was a conscientious teacher of his flock, and it was his pleasure to instruct the children of his parish in sacred music. His house was the resort of the learned, his purse always open to the needy, and his medical

Rabies

skill was employed in the service of his parish. He died in 1553.

Rabies. See HYDROPHOBIA.

Rabshakeh, an officer of the King of Assyria, taken in the Authorized Version of the Bible as the name of a person; but apparently an official title, presumably that of the chief cup bearer.

Raccahout, a starch or meal prepared from the edible acorn of the Barbary oak (*Quercus Ballota*), sometimes recommended as food for invalids. Mixed with sugar and aromatics it is used by the Arabs of Northern Africa as a substitute for chocolate.

Raccoon, or **Racoon**, the genus *Procyon* and especially *P. lotor*, a handsome animal, about the size of a large cat, brown furry



RACCOON: *PROCYON LOTOR*.

hair, tail bushy and ringed; body large and unwieldy, legs short, feet with strong fossorial claws. It is omnivorous and ranges over a large part of North America, where it is hunted for its fur. The crab-eating raccoon (*P. cancrivorus*), from South America, ranging as far N. as Panama, differs chiefly from the former in the shortness of its fur, and consequent slender shape. The black-footed form has received specific recognition as *P. nigripes*.

Raccoon Dog, in zoölogy, the *Nyctereutes procyonides*, somewhat resembling a raccoon in appearance. Body about 28 inches in length, covered with long brown fur, tail about four inches long; the back arched somewhat like that of a weasel; legs long and slender. Also, any dog trained to chase or hunt raccoons, for which task peculiar sagacity is necessary in the dog in order to preserve himself from injury.

Raccoon River, a stream in Iowa, rises in Buena Vista county, runs S. E., intersects Sac, Carroll, Greene, and Dallas counties, and enters Des Moines river at the city of Des Moines. Its length is estimated at 170 miles.

Race, a class of individuals sprung from a common stock; the descendants collectively of a common ancestor; a family, tribe, nation, or people belonging, or supposed to belong, to the same stock.

The human family, according to Blumen-

Rachel

bach, comprises five distinct races of men, viz.: The Caucasian, or white race, inhabiting Southwestern Asia, the greater part of Europe, large portions of North and South America, and Australia; the Ethiopian, black or negro race, occupying tropical and Southern Africa, some of the Pacific islands, part of Australia, and portions of North America, into which they were originally brought as slaves; the Mongolian, or yellow race, occupying Northern and Eastern Asia; the Malayan, or brown race, inhabiting the islands of the Indian and Pacific Oceans, the Australian continent, and the Malay Peninsula; and the American Indian, or red race, of North and South America. another classification is that given by other writers who divide the races into Indo-Germanic or Aryan, inhabiting Europe, Persia, etc., and numbering 545,500,000; Mongolian or Turanian, covering the greater portion of Asia, with a population of 630,000,000; Semitic or Hamitic, living in North Africa, Arabia, etc., 65,000,000; Negro and Bantu, Central Africa, 150,000,000; Hottentot and Bushmen, South Africa, 150,000; Australasian, Polynesian or Malay, Australasia and Polynesia, 35,000,000; American Indian, North and South America, 15,000,000 — giving a total of nearly 1,500,000,000.

Race Horse, a blood-horse, specially bred for racing or steeple-chasing. It appears from the first edition of the "Stud Book" (1791) that the first strain of Arab blood was derived from a horse bought by James I. of a Mr. Markham for 500 guineas, but since then many Arab, Barb, and Turkish sires and dams have contributed to form the breed of race horses. Youatt notes as their chief points: A beautiful Arabian head, fine and finely set-on neck, oblique lengthened shoulders, well-bent hinder legs, ample muscular quarters; flat legs, rather short from the knee downward, and long elastic pastern. In ornithology, the *Micropeterus brachypterus* (*Oidemia patachonica*), called also the steamer duck. Both names refer to the swiftness of its motion through the water.

Raceme, in botany, a kind of inflorescence, in which the flowers are on simple stalks distinct from each other, and arranged around a common axis.

Racemose Glands, glands in which the secreting cavity is made up of a number of smaller lobules. Those with but few lobules, like the sebaceous glands, are sometimes termed simple, and resemble a portion of larger or compound racemose glands, of which the mammary gland is an example.

Rachel, the second daughter of Laban, the dearly beloved of Jacob, who, to obtain her, devoted seven years to the flocks and herds of her father. But, at the end of

that period, he found in his veiled bride not Rachel, but Leah, her elder sister, whom he did not love, and was obliged to labor during seven more years in order to gain her. She was the mother of Joseph and Benjamin.

Rachel, Eliza Rachel Felix, a French actress; born in Muraph, Switzerland, Feb. 28, 1820; was the daughter of a Jew pedlar. The family gained a livelihood by periodically visiting various towns in Germany and Switzerland, and at length settled in Lyons, and in 1830 went to reside at Paris. Sarah, her elder sister, used to sing at the various cafés, to the accompaniment of an old guitar, while Rachel went from table to table to collect the offerings of the spectators. In 1832, the voices of the two sisters having attracted notice, they were placed, by the kindness of some connoisseurs, under Choron, a celebrated singing-master; and in 1833, the elder sister Rachel, having shown great tragic power, entered the Conservatoire at Paris, where she was carefully trained by Saint-Aulaire and Samson, and in 1838 made her first appearance at the Theater Français, in the character of Camille, in "Les Horaces," where her début was not auspicious. But the coldness of her reception was not of long duration. The sharp critical eye of M. Jules Janin soon discovered in her a worthy interpreter of the best works of Racine and Corneille; and his brilliant criticisms on her performances soon roused the public sentiment in her favor, which was fully justified by the result. In the course of a few months Mademoiselle Rachel completely revived the classic school of tragedy which had fallen into decay, though her crowning triumph was gained in 1843, in her representation of "Phédre." Soon after this she made a provincial tour, visited the chief European cities, and at last came to London, in 1846, reaping large harvests both of fame and wealth wherever she appeared. In 1855 she made a professional visit to the United States, but she was interrupted in the middle of great success by the failure of her health, returned to France, and died of consumption in Cannes, near Toulon, Jan. 3, 1858.

Rachis (rā'kīs), in botany, a branch which proceeds nearly in a straight line from the base to the apex of the inflorescence of a plant. The term is also applied to the stalk of the frond in ferns, and to the common stalk bearing the alternate spikelets in some grasses.

Rachitis, a term which properly implies inflammation of the spine, but it is applied to the disease called rickets, which term suggested this as the scientific name.

Racine, a city and county-seat of Racine co., Wis.; on Lake Michigan at the mouth

of the Root river, and on the Chicago, Milwaukee, and St. Paul, and the Chicago and Northwestern railroads; 23 miles S. of Milwaukee. Here are the Racine College, Racine Academy, the Racine Home School, St. Catherine's Academy (R. C.), high school, Taylor Orphan Asylum, St. Luke's Hospital, waterworks, electric light and street railroad plants, many churches, a number of National and State banks, and several daily, weekly, and monthly periodicals. The harbor is one of the best on the lake, and is accessible by vessels drawing 14 feet of water. Racine has manufactories of agricultural implements, carriages, leather, iron castings, lumber, etc., and an assessed property valuation of nearly \$11,000,000. Pop. (1890) 24,798; (1900) 29,483; (1910) 38,002.

Racine, Jean, an eminent French dramatic poet; born in La Ferté Milon, France, Dec. 22, 1639, and was educated at Port



JEAN RACINE.

Royal. He commenced his poetical career in 1660, by an ode on the king's marriage, for which he was handsomely rewarded. In 1664 he produced his tragedy of "La Thébiade," which was followed in 1666 by "Aléxandra." In 1688 appeared his "Andromarque," which placed him far above all his contemporaries except Corneille; and his fame was still further increased by the production of "Britannicus," "Bérénice," and other tragedies. In 1677 appeared his tragedy of "Phédré," which was opposed by one of the same subject written by Pradon which gave him great uneasiness; and owing to a base cabal that was formed against him, he was induced to desist from writing for the stage. After a lapse of 12 years he wrote, by desire of Louis XIV. and Madame de Maintenon, the sacred dramas of "Esther" and "Athalie," which were performed by the young ladies of the

institution of St. Cyr. Besides his dramatic works, he wrote "Canticles and Hymns for the use of St. Cyr," the "History of Port Royal," etc. In 1673 he was received into the academy, and continued to enjoy the highest favor at court; but having offended the king by a too free use of his pen in drawing up a memorial on the distresses of the people, he lost favor. Submitting implicitly to the code of laws laid down by the critics of his time, he did much toward making the regular or classical school of the drama acceptable and permanent, by imparting to his tragedies all the perfection which it is possible to conceive genius as giving to works constructed on so narrow a model. He is not equal to Corneille in vigor and genius, but his grace and melody of diction are exquisite; and his refined tenderness of feeling, often melting into profound pathos, breaks out through all the barriers imposed by the unities, and the simple plots, and the monotony of the rhymed Alexandrine verses. He died April 21, 1698.

Racine, Louis, a French poet and critic, son of Jean Racine; born in Paris, France, Nov. 2, 1692. He is chiefly noteworthy for his two poems, "Grace" (1720), and "Religion" (1742), which passed through 60 editions. He wrote in prose: "Reflections upon Poetry"; "Memoirs of the Life of Racine"; and "Remarks on Racine's Tragedies." ("Complete Works," 1808.) He died in Paris, Jan. 29, 1763.

Racing Crab. See SAND CRAB.

Rack, an apparatus for the judicial torture of criminals or suspected persons. It consisted of a large, open, wooden frame, within which the person to be tortured was laid on his back on the floor, with his wrists and ankles fastened by cords to two rollers at the ends of the frame. These rollers were then drawn or moved in opposite directions till the body rose to a level with the frame. Interrogations were then put, and if the prisoner refused to answer, or if his answers were not considered satisfactory, the rollers were further moved, until at last the bones of the sufferer were forced from their sockets. The rack was formerly much used in Europe by the civil authorities in the cases of traitors or conspirators, and by the officers of the Inquisition to force a recantation of heretical or so-called heretical opinions.

In gearing, a toothed bar whose pitch line is straight, adapted to work into the teeth of a wheel for the purpose of changing rectilinear into circular motion, or vice versa. This contrivance is called a rack-and-pinion, and the motion so imparted rack-and-pinion motion. In horology, a steel piece in the striking part of a clock. It consists of a bar attached radially to an axis, and

having a lower and an upper arm. The former is called the rack tail. The latter is indented with 12 notches, to effect the striking of the right number. In lace, a certain length of lace-work counted perpendicularly, and containing 240 meshes. In metallurgy, an inclined frame or table, open at the foot, and upon which metalliferous slimes are placed and exposed to a stream of water, which washes off the lighter portions. Nautically, (1) A frame of wood with belaying-pins, or a row of blocks for fair-leadings, or a row of sheaves for reeving the running-rigging. (2) A frame with holes for round shot. (3) A box in which the halyards are coiled away.

Racket, the instrument with which players at tennis or rackets strike the ball; a bat, consisting of an elliptical loop formed of a thin strip of wood, across which network of cord or gut is stretched, and to which a handle is attached. Also a snowshoe of cords stretched across a long and narrow frame of light wood; and a broad shoe or pattern made of wood, used on a man or a horse to support him on the surface of boggy ground. In ornithology, a spatule.

Racovian Catechism, a catechism containing a popular exposition of the Socinian creed. Properly speaking there were two, a smaller and a larger, both published in Germany by Smalcius, the former in 1605, the latter in 1608. The larger one was translated into English in 1652, probably, by John Biddle.

Racquets, a game played in a prepared court, open or close, with a small hard ball and a bat like that used for playing tennis. The close or roofed court is now generally preferred for playing in. It is an oblong, rectangular area, 80 feet long and 40 broad when of full dimensions, and having high walls. The floor is divided into two chief areas of unequal size by a line, called the "short line," drawn across it at two-fifths of the length of the court from the back wall, the smaller area being again divided into two equal parts by a line at right angles to this, and two small areas being marked off in the other space next the short-line, called "service spaces." Two horizontal lines are also drawn across the front wall, one 2 feet 2 inches above the floor, below which if the ball strike it is out of play, the other, the "cut line," 7 feet 9 inches above the floor. The game may be played with either one or two persons on each side. It is decided by lot which side goes in first, and the first player assumes which side of the court he pleases (usually the right), while the other stands in the opposite corner. The first player then begins to "serve," which consists in striking the ball with the bat so as to make

it strike the front wall above the cut line, and then rebound into the opposite corner. If the ball is properly served the second player must strike it before it has made a second bound, so that it strikes the front wall above the lower line; but in returning the ball in this manner the player may if he likes first make it strike either of the side walls. The player may also return it before it touches the floor. The first player then returns the ball in the same way, and this goes on until either player fails. If it is the first player who fails, it is then the turn of the second player to serve. If it is the second player, the first scores one (an ace), and continues to serve, but goes to the opposite side of the court. In general 15 is the game.

Radcliffe, Ann, an English novelist, whose maiden name was Ward; born in London, England, July 9, 1764; and in her 23d year was married to Mr. W. Radcliffe, proprietor and editor of the "English Chronicle." Her first performance was a romantic tale, entitled "The Castles of Athlin and Dunbayne"; which was succeeded by "The Sicilian Romance" and "The Romance of the Forest"; but that which made her reputation was the "Mysteries of Udolpho," in four volumes. Mrs. Radcliffe possessed the art of exciting a high degree of interest in her narrative; her descriptive powers were of a superior order, especially in the delineation of scenes of terror, and in those aspects of nature which excite sentiment, and suggest melancholy associations. She died in London, Feb. 7, 1823.

Radcliffe College, an educational non-sectarian institution in Cambridge, Mass., for women; opened in 1879; has an endowment of over \$650,000; grounds and buildings valued at over \$700,000; volumes in the library, about 24,000; scientific apparatus, etc., \$12,000; ordinary income, about \$120,000; average faculty, 120; average students, 460.

Radetzky, Joseph Wenzel, Count, an Austrian general; born in the castle of Frebnitz, in Bohemia, Nov. 2, 1766. Called to participate in the long struggle against Napoleon, and having won his way to the rank of Major-General, he fought at Agram and Erlingen; distinguished himself in the battles of 1813, 1814, and 1815; and at Kulm, Leipsic, and Brienne, exhibited great skill and bravery; but afterward he became nothing more than the able executioner of a despotic government. Having been successively governor of Ofen in Hungary, and Lemberg in Poland, he was, in 1822, appointed commander-general of the Lombardo-Venetian kingdom. In 1848 the people of Milan rose against their Austrian oppressors, and after a gallant struggle drove them out of the city. Radetzky

retreated upon Verona, to await the arrival of reinforcements. Shortly afterward, Charles Albert, King of Sardinia, joined the popular cause, and crossing the Adige, placed his army between the Austrian commander and the troops which were marching to his aid. In the end, however, the old marshal proved too skillful a strategist for the Piedmontese king, and after many severely contested battles, Charles Albert was signally defeated at Novara. This battle decided the fate of the Italian cause, and Austrian tyranny was again triumphant in Lombardo-Venetia. After 73 years of service in the Austrian armies, he was permitted to resign at the commencement of the year 1857. He died in Milan, Italy, Jan. 5, 1858.

Radford, William, an American naval officer; born in Fincastle, Va., March 1, 1808; entered the navy in March, 1825; was promoted lieutenant in February, 1837; served in the war with Mexico, and conducted the party which in 1847 cut out the "Malokadel," a Mexican war vessel, at Mazatlan. He was promoted commander in September, 1855. When the Civil War broke out he was assigned to the "Cumberland"; was promoted captain in July, 1862, and commodore in April, 1863. During the assault on Fort Fisher, in December, 1864, he commanded the "New Ironsides" and the ironclad portion of Porter's fleet. Early in 1865, Admiral Porter wrote: "Commodore Radford has shown ability of a very high order, not only in fighting and maneuvering his vessel, but in taking care of his division. His vessel did more execution than any other in the fleet, and I had so much confidence in the accuracy of his fire that even when our troops were on the parapet he was directed to clear the traverses of the enemy in advance of them. This he did most effectually, and but for this the victory might not have been ours." Radford was promoted to rear-admiral in July, 1866, and was retired on March 1, 1870. He died in Washington, D. C., Jan. 8, 1890.

Radhanpur, chief town of a protected State in Bombay presidency; India, 150 miles N. W. of Baroda. It is surrounded with walls and encloses a fortified castle, the residence of the native prince. Pop. 14,722. The State of Radhanpur has an area of 1,150 square miles. Pop. 98,129.

Radiant, in botany, diverging from a common center, like rays. In heraldry an epithet applied to any ordinary or charge, when it is represented edged with rays or beams; rayonnant; reyonnée. In astronomy, the point in the heavens from which a star shower seems to proceed. In geometry, a straight line proceeding from a given point or fixed pole, about which it is conceived to revolve. In optics, the luminous

Radiata

body or point from which rays of light falling on a lens or mirror diverge.

Radiata, in zoölogy, a term introduced by Cuvier, in 1812, for the lowest of his great groups or enbranchements. He described them as having radial instead of bilateral symmetry, apparently destitute of nervous system and sense organs, having the circulatory system rudimentary or absent, and respiratory organs on or coextensive with the surface of the body; and included the Echinodermata, Acalepha, Entozoa, Polypi, and Infusoria. Wider knowledge led to the narrowing of the limits of this group, and through Agassiz pleaded for its retention (with the three classes of Polypi, Acalephæ, and the Echinoderms), Huxley's "Lectures on Comparative Anatomy" finally broke up what he called the "radiate mob" and distributed its constituents among the Echinodermata, Polyzoa, Vermes, Cœlenterata, and Protozoa.

Radiation, in physics, the transmission of heat, light, or actinic power (hence known as forms of "radiant energy") from one body to another without raising the temperature of the intervening medium. It takes place in all directions around a body. In a homogeneous medium it takes place in straight lines. Radiation proceeds *in vacuo* as well as through air. Its intensity is proportioned to the temperature of the source, and it diminishes according to the obliquity of the rays with respect to the radiant surface, and the radiating or emissive power of a body, or its capability of emitting at the same temperature, and with the same extent of surface, greater or less quantities of heat. The energy received from a radiating body is inversely proportional to the square of the distance; and the radiation of a body is exactly proportional to its absorbing power. If the radiating power of lampblack be reckoned at 100, that of platinum foil is 10.80; copper foil, 4.90; gold leaf, 4.28, and pure laminated silver 3.80. Solar radiation is the radiation from the sun; terrestrial radiation that from the earth into space.

Radical, in chemistry, a group of elements common to a more or less numerous series of allied compounds, and unaffected by the processes whereby these compounds are transformed one into another, *e. g.*, Ethyl (C_2H_5), the radical of common alcohol (C_2H_5HO). In mathematics, an indicated root of an imperfect power of the degree indicated. Radicals are divided into orders according to the degree of the root indicated; thus, an indicated square root of an imperfect square is a radical of the second degree. In philology, (1) A radix, root, or simple underived, uncompounded word. (2) A letter which belongs to the root; a primitive letter. In English poli-

Radiometer

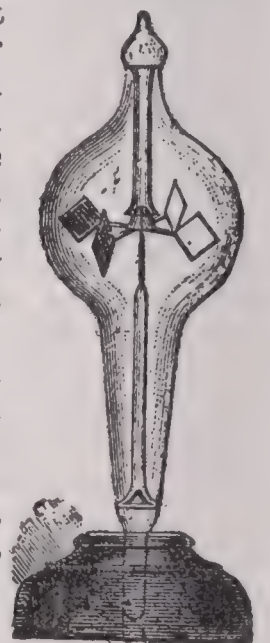
tics, an ultra-liberal, verging on Republicanism; one of that party in the state which desires to carry out a radical reform of the constitution, and to give greater power to the democracy. The term was first used in England and applied as a party name in 1818 to Henry Hunt, Major Cartwright, and others of the same party, who wished to introduce radical reforms in the representative system, and not merely to disfranchise and enfranchise a borough or two. In the United States the term was applied to members of the Republican party who favored the so-called "reconstruction policy" of the government.

Radiograph, a picture of an object or objects obtained by means of the Roentgen rays instead of light rays; called also skia-graph.

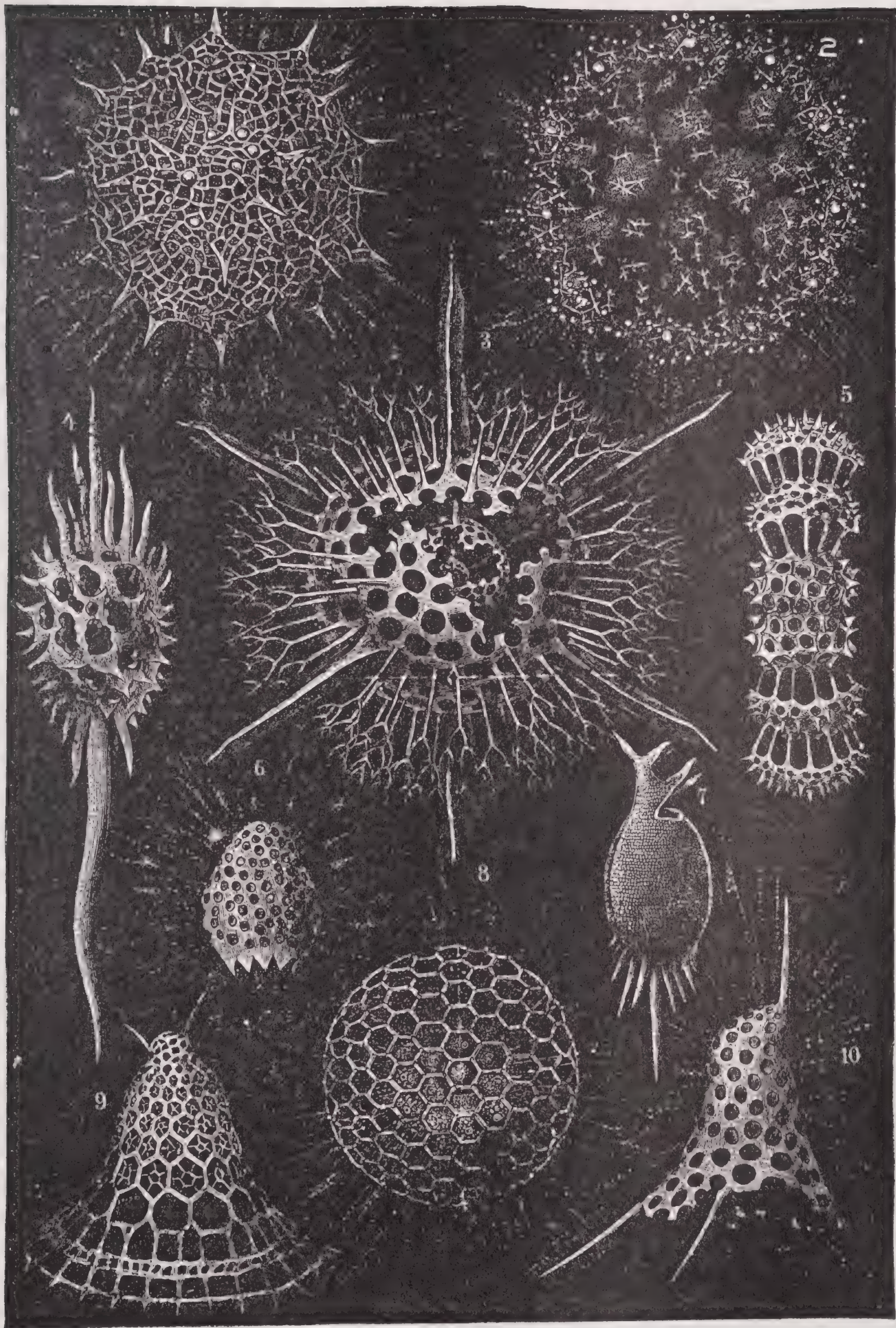
Radiography, the art or process of producing radiographs, skiagraphs, or shadow-pictures of objects by the action of the Roentgen or X-rays upon certain sensitive salts.

Radiolaria, in zoölogy, according to E. Ray Lankester, a class of Protozoa, consisting of Gymnomyxa in which the protoplasmic body of the dominant amœba phase has the form of a sphere or cone (from the surface of which radiate filamentous pseudopodia, occasionally anastomosing), and incloses a spherical or cone-shaped perforated shell of membranous consistence, known as the central capsule, and probably homologous with the perforated shell of a Globigerina. Radiolaria is formed from the Trias onward. The Barbadoes earth, a deposit of sandstones and marls, is principally composed of the siliceous skeletons of radiolaria.

Radiometer, an instrument that is used for taking the altitudes of the celestial bodies. Also an instrument invented by Crookes for measuring the mechanical effect of radiant energy, and exhibited by him at the Royal Society, April 7, 1875. It resembles a miniature anemometer, and revolves by the action of light. The cups of the anemometer are replaced by disks, colored white on one side and black on the other, and the instrument is inclosed in a glass globe from which the air has been exhausted, so that no heat is transmitted. When the disks are exposed to light, revolution begins and its speed is governed by the intensity of the light. Two candles produce twice the effect of one, and the flame of magnesium wire makes the disks spin with great rapidity.



CROOKES'
RADIOMETER.



RADIOLARIA:

- 1, *Rhizoepona leptomila*; 2, *Sphaerocapsa ovoidomare*; 3, *Actinomma drymodes*; 4, *Lithomispilus flammabundus*; 5, *Ommatocampe nereides*; 6, *Carpocanium diadema*; 7, *Challengeria willemoesii*; 8, *Heliosphaera inermis*; 9, *Clathrocyclas ionas*; 10, *Dictyophimus tripus*.

Radium

Radium, a metallic substance discovered in 1898 by Mme. Sklodowska Curie, her husband, Prof. Pierre Curie, of the Sorbonne, Paris, and Prof. G. Bemont, all of whom were engaged in scientific work in Paris for several years. Mme. Curie found in experimenting that salts of thorium emitted substantially the same peculiar radiations as uranium compounds, and also that a large number of natural minerals, which are mixtures of several salts, but which contained either radium or thorium, were radio-active. A belief that one or the other of these two metals was responsible for the phenomenon led Mme. Curie to undertake an experiment which suggested a different conclusion. She manufactured an artificial chalcocite, which in its natural state is about twice as powerful as uranium in emitting what are known as the Becquerel rays, but the product failed to exhibit the same radiating power as the natural salt. This result suggested that some other element was present in the latter. Professor Curie then joined his wife in the experimenting and afterward Professor Bemont and the two new elements were eliminated, POLONIUM (*q. v.*) and radium. The latter is a white crystalline substance with a strong illuminating power, its light being said to be capable of piercing three feet of iron. The first announcements of the discovery were received by the scientific world with incredulity; but when Professor Curie exhibited the substance in a lecture before the Royal Institution in London, and such men as Sir William Crookes, Lord Rayleigh, Prof. Ray Lankester, Professor Dewar, and Sir Oliver Lodge reported the results of individual investigations, both the scientific and the unscientific worlds came to regard the discovery as one of extraordinary moment; and soon the costly substance was applied to the treatment of cancer, consumption, and other afflictions. Lord Kelvin has drawn attention to the fact that radium emits three kinds of rays — (1) the a-ray, positively electrified and largely stopped by solid, liquid, or gaseous screens; (2) the b-ray, more penetrative than the a-ray and negatively electrified; and (3) the g-ray, electrically neutral and much more penetrative than either of the other two, passing with but little loss through a lead screen one centimeter thick, which is an almost perfect screen against the other rays. Sir William Ramsey has announced that when submitted to certain conditions radium will give off a heavy gas that slowly changes into helium, another element, and then vanishes entirely, and Prof. S. A. Tucker, of Columbia University, says that the peculiar feature of this last discovery is that an element, supposedly indivisible, should under certain conditions produce another element. Experiments with radium are daily developing new surprises.

Radzivil

Radius, in anatomy, the outer of the two bones of the forearm. It extends from the humerus to the carpus, and articulates with the humerus, the ulna, the scaphoid, and the semilunar bones. In botany, and plural form, the peduncles supporting the partial umbels in an umbellifer. In fortification, a line drawn from the center of the polygon to the end of the outer side. In geometry, the distance from the center of a circle to any point of the circumference. All radii of the same circle, or of equal circles, are equal. The radius of a sphere is half a diameter, or it is the distance from the center to any point of the surface. In the same or equal spheres, all radii are equal. In trigonometry the radius is the whole sine, or sine of 90°. The radius of curvature of a curve at any point is the radius of the osculatory circle at that point. It is so called because its reciprocal is taken as the measure of the curvature at that point.

Radowitz, Joseph von, a Prussian statesman; born in Blankenburg, Feb. 6, 1797; was the son of a nobleman of Hungarian descent, and in 1813 entered the Westphalian army as an officer. After the peace of 1815 he taught in the military school of Cassel; but in 1823 he entered the Prussian service, and in 1830 became chief of the general staff of artillery. By his marriage he became connected with the Prussian aristocracy, and soon became the leader of the anti-revolutionary party. In 1836 Radowitz was sent as Prussian military commissioner to the German Diet at Frankfort, and held diplomatic posts at Carlsruhe, Darmstadt, and Nassau. He was the confidant and adviser of King Frederick-William IV., in his endeavors to bring about a reform of the German Diet. After the revolution of 1848 the endeavors of Prussia to give a constitution to Germany, by means of the alliance of the three kings, was principally his work. He wrote several works, mainly political, and died Dec. 25, 1853.

Radzivil, or **Radziwill**, the name of an ancient Polish family of Lithuania, which commenced to figure in history in the 14th century. Nicholas Radzivil, the first of the name, was created by Jagellon, Grand-Duke of Lithuania, palatine of Wilna. The most celebrated of his descendants were: NICHOLAS, palatine of Wilna and governor of Livonia, under Sigismund Augustus, King of Poland. He signalized himself by his valor against the Teutonic order in 1557, and against the Russians, whom, in 1565, he completely defeated. He abjured the Catholic for the Protestant religion, which he propagated zealously, and at his own expense produced a Polish translation of the Bible, which was condemned at Rome. Born about 1500. He died in 1567. His de-

scendants reverted to the Roman Catholic faith. CHARLES RADZIVIL, palatine of Wilna, distinguished himself by his opposition to the Russians, and was the great rival of the powerful Czartoryski family. Nominated, in 1762, governor of Lithuania, by Augustus III., King of Poland, he energetically combated Russian influence; but, not succeeding in preventing the dismemberment of his native country, he went into exile, but returned to Poland shortly before his death, which took place in 1790.

Rae, John, a British Arctic traveler; born in Wick, Scotland, May 26, 1813; studied medicine in Edinburgh, and went to Hudson Bay as physician of the Company's ships. In 1845 he undertook an exploring expedition, and in 1846-1847 a more extensive one, wintering in Repulse Bay. He was second under Richardson in 1848 on a Franklin search voyage. In 1853-1854 he commanded an expedition that proved King William's Land to be an island. In his various journeys nearly 1,800 miles were traveled over for the first time. In 1860 he surveyed a telegraph line to the United States by the Faroes and Iceland, and visited Greenland; and in 1864 he made a telegraph survey from Winnipeg across the Rocky Mountains. He published reports of his various expeditions and notes on the Eskimos; "Eight Hours for Work"; "Life of Adam Smith," etc. He died July 21, 1893.

Raeburn, Sir Henry, a Scotch painter; born in Edinburgh, Scotland, March 4, 1756. Bound apprentice to a goldsmith, he was no sooner free than he devoted himself to portrait painting, and with the view of improving in his art went to London, afterward spending two years in Italy. Returning in 1787, he established himself in Edinburgh, and soon rose to the head of his profession in Scotland. His portraits are distinguished by grasp of character, breadth of treatment, and excellent color. He was knighted by George IV., in 1822, and died in Edinburgh, July 8, 1823.

Raff, Joachim, a German composer; born in Lachen, on Lake Zurich, May 27, 1822. He began life as a schoolmaster, but encouraged by Mendelssohn, he devoted himself to music. From 1850 to 1856 he lived near Liszt in Weimar, then taught music at Wiesbaden till 1877; and from that year till his death, June 24, 1882, he was director of the musical conservatory at Frankfurt-on-Main. He published more than 200 musical productions, including symphonies, overtures, concertos for violin, 'cello, and piano, operas, quartettes, a great variety of pieces for piano and violin, and for piano alone. The symphonies "Leonore" and "In the Forest" are reputed his best works. In "The Wagner Question" (1852), and nu-

merous papers contributed to the "New Journal of Music," he advocated the works and aims of the new German music school.

Raffle, formerly a game of dice; according to Cotgrave, one with three dice in which he who threw all alike won the stakes. Now a chance or lottery in which some article is put up by the owner to be drawn or thrown for by several persons who subscribe a small sum each, he who draws or throws the winning number to become possessor of the article. The money subscribed goes to the original owner of the article.

Raffles, Sir Thomas Stamford, an English naturalist; born at sea, July 5, 1781. He entered the East India Company's civil service, and in 1811, on the reduction of Java by the British, he was made lieutenant-governor of the island. In this post he continued till 1816, when he returned to England with an extensive collection of the productions, etc., of the Eastern Archipelago. The year following appeared his "History of Java." Having been appointed to the lieutenant-governorship of Bencoolen, Sumatra, he went out in 1818 to fill this post; founded the settlement of Singapore, and returned to Europe in 1824. He died July 5, 1826.

Rafflesia, named after Sir Thomas Stamford Raffles, the typical genus of *Rafflesiaceæ*. The first and finest species discovered was *R. arnoldi*, found by Raffles and Dr. Arnold in Sumatra in 1818. The flower (there is no stem) is more than a yard across, the lobes of the perianth a foot, the cup of a capacity to hold 12 pints, the estimated weight of the whole plant 15 pounds. All this development takes place in a few months. The flowers are fugacious, and have a fetid scent when they putrify. *R. arnoldi* is parasitic on a *Cissus*, as is *R. patma* from Java, where it is considered a powerful styptic.

Rafflesiaceæ, rafflesiads; an order of rhizogens. Stemless plants, having flowers immersed among scales, and growing directly from the surface of leaves. Perianth globose or campanulate, superior, limb five-parted, the throat surrounded by calli, either distinct or constituting a ring. Column salver-shaped, or globose, with a row of anthers. Genera 5; species 16.

Rafia, or **Rofia**, a commercial fiber obtained from the rofia palm, which is indigenous to Madagascar, being found along the coast in great abundance. The fiber is obtained from the under part of the leaves. It is a thin skin that can be peeled off straight to the tip without breaking. When first taken from the leaf it is pale green, but turns to a light straw color when dried in the sun. The natives use it in making clothing and sacking. In the United States

Rafinesque

it is used by nurserymen and gardeners for tying up bushes, vines, etc., as it is pliable and does not injure the plant. Rafia has been introduced recently into the public schools, where it is very extensively used in kindergarten and manual training work, especially for making baskets, hats, trays, and other fancy articles.

Rafinesque, Constantine Samuel, an American botanist; born in Galatz, Turkey, in 1784; traveled in Pennsylvania and Delaware in 1802-1805; and returned to Turkey with a collection of botanical specimens. He settled permanently in the United States in 1815, and was made Professor of Botany in Transylvania University, Lexington, Ky., in 1818. Later, after lecturing in various places, he removed to Philadelphia. His publications include "Ancient History, or Annals of Kentucky" (1824); "Medical Flora, etc., of the United States" (2 vols. 1828-1830); "American Manual of the Grape Vines" (1830); "A Life of Travels and Researches in North America and South Europe" (1836); "The American Monuments of North and South America" (1838); "Celestial Wonders and Philosophy of the Visible Heavens" (1839); "Pleasures and Duties of Wealth" (1840); etc. He died in Philadelphia, Pa., Sept. 18, 1842.

Rafn, Karl Christian, a Danish critic and archæologist; born in Brahesborg, Denmark, Jan. 16, 1796. He was educated at the University of Copenhagen, of which he was appointed sub-librarian in 1821. It is to Rafn's unwearied exertions that Denmark owes the foundation (1825) of the Society for Northern Antiquities. As secretary of this society he edited and published a great many ancient Scandinavian MSS., occupying about 70 volumes. He was named professor in 1826. Among his numerous works are a Danish translation of Norse mythic and romantic sagas (1821-1826), and his "American Antiquities" (1837), in which he shows that America was discovered by Norsemen in the 10th century (see VINLAND). He died in Copenhagen, Oct. 20, 1864.

Raft, a sort of float or framework, consisting of logs or other pieces of timber fastened together side by side, for convenience in transporting them down rivers, across harbors, etc. Also a floating structure made and used in the emergency of shipwreck. Rafts are made of materials usually accessible on shipboard, spars lashed together by ropes, the flotative power being increased by empty casks lashed in the structure. When made and furnished as a part of a ship's equipment they are constructed with pontoons, and provided with stanchions and ropes, which form a protection against persons falling or being washed overboard.

Raglan

Such a raft is carried in a collapsed condition for compact stowage, and is more readily launched in that less bulky condition; after it is in the water it is brought into working shape by the purchases. Also a large collection of timber and fallen trees, which, floating down the great rivers of the Western United States, are arrested in their downward course by flats or shallow places, where they accumulate, and sometimes block up the river for miles.

Rafter, in building, one of the pieces of timber which follow the slope of the roof, and to which are secured the laths into which the shingle or slate nails are driven. The rafter, in one or more lengths, extends from the eave to the ridge of the roof; at its lower end resting on the wall plates, and at its upper end abutting on a corresponding rafter rising from the opposite side of the roof, or resting against a crown or ridge plate, as the case may be. Rafters, though all performing the same general duty, have specific names according to their particular functions; as hip-rafter, jack-rafter, etc.

Ragatz, a spa of Switzerland, in the S. E. corner of the canton of St. Gall, 68 miles S. E. of Zurich and 13 N. by W. of Chur (Coire), at the mouth of the ravine leading to Pfäfers from which town it gets its healing waters by means of a pipe (1838-1840) 2½ miles long. Schelling, the German philosopher, is buried in the parish churchyard.

Ragee, or **Raggee**, an Indian grain (*Eleusine coracana*), very prolific, but probably the least nutritious of all grains. In the form of cake or porridge it is the staple food of the poorer classes in Mysore and on the Neilgherries.

Ragged Schools, a name applied to institutions founded during the 19th century for the moral reclamation and Christian instruction of the juvenile and adult necessitous poor in England.

Raglin. See RATHLIN.

Raghuvansa, a great Sanskrit epic, attributed to KÁLIDÁSA (*q. v.*). The subject is similar to that of the "Rámáyana," but begins with an account of Ráma's ancestors, "the family of Raghu," an ancient King of Ayodhya (Oudh). The text, with a Latin translation, was published by Stenzler (Lond. 1832).

Raglan, Fitzroy Somerset, Lord, a British military officer; born Sept. 30, 1788. He was the son of the 5th Duke of Beaufort. He joined the 4th Light Dragoons at the age of 16, went with the troops to Portugal, and fought in all the great Peninsular battles, winning the notice and strong regard of the Duke of Wellington, who made him first his aide-de-camp, and then his military secretary, though he was under 22.

At Waterloo he lost his right arm. On the death of the Duke of Wellington, Raglan was appointed Master-General of the Ordnance, and, at the outbreak of the war between France, England, and Russia, he was selected to take the command of the forces ordered to proceed to the Crimea, commanded at the battles of the Alma, Balaklava, and Inkermann, was promoted to the rank of field-marshal, and during the protracted siege of Sebastopol which followed, in the midst of winter, in a severe climate, and surrounded by difficulties, maintained a calmness, dignity, and fortitude, which nothing could surpass. Grief at the unsuccessful attack on the Malakoff and the Redan on the fatal June 18, and the loss of life which it entailed, preyed on his mind, and he succumbed June 28, 1855.

Ragman Roll, a deed with seals, such as a papal bull. Also, the collection of deeds by which the Scotch nobles were constrained to subscribe allegiance to Edward I. in A. D. 1296. It consists of four large rolls of parchment, composed of 35 pieces sewed together, kept in the Tower of London. Also, an old game, in which, in imitation of the bull with its many seals depending from it, a parchment roll was provided, on which were written verses descriptive of persons' characters, and against each verse was fastened a string. The parchment was rolled up, with the ends of the strings hanging out. The player chose one of the strings, and thus learnt his character. The term is also sometimes used to designate a long list or catalogue; or an unintelligible or tedious story, a rigmarole.

Ragnarök, the end of the world, when the gods (Odin, Thor, etc.) shall be overcome by their enemies and the world be burned up. See MYTHOLOGY, NORTHERN.

Ragotski, Francis, a prince of Transylvania; born in 1676; entered into secret negotiations with Louis XIV. to bring about the emancipation of his country from Austrian rule, but his schemes having been detected, he was arrested and condemned to death for high treason. He made his escape, and then roused the people of Hungary against the imperial despotism. For a time he was prosperous in his career, and was proclaimed protector, but, in the end, certain of the Hungarian States entering into an alliance with Austria, his plans were defeated, he renounced his estates, and took refuge in Turkey. He wrote the memoirs of his own life and adventures. He died in 1735.

Ragout, a dish of meat stewed and highly seasoned.

Ragozin, Zénäide Alexeievna, a Russian-American Oriental writer; born in Russia, in 1835. She came to the United States in 1874. Her most important books

are: "The Story of Chaldea" (1886); "The Story of Assyria" (1887); and "The Story of Media, Babylon, and Persia" (1888), all in the "Stories of the Nations" series; "History of the World"; "Siegfried, the Hero of the Netherlands"; "Roland, the Paladin of France"; "Salammbô, the Maid of Carthage," etc.

Rags, though valueless for most purposes, are yet of great importance in the arts, particularly in paper making (see PAPER). Besides the rags collected in the United States, the article is imported in large quantities from various foreign countries. Woolen rags, not being available for paper, are much used for manure; but those of a loose texture, and not too much worn, are unraveled by means of machinery, and mixed up with good wool, to form what is known as "shoddy," with which cheap woolen goods are made; while the refuse is pulverized and dyed various colors, to form the flock used by paper stainers for their flock-papers.

Ragstone, in geology, a rough siliceous rock, breaking into rag-like fragments. It is well adapted for sharpening steel instruments. Applied (1) to the Rowley Rag and (2) by Dr. Wright to what he calls an Upper Ragstone found in the Inferior Oölite at Leckhampton Hill, near Cheltenham, England. Associated with it are the Trigonina and Gryphæa beds.

Raguet, Condé, an American political economist; born in Philadelphia, Pa., Jan. 28, 1784. He wrote: "Principles of Free Trade" (1835); "On Currency and Banking" (1839); etc. He died in Philadelphia, March 22, 1842.

Ragusa, a city of Dalmatia; on the E. shore of the Adriatic, 100 miles S. E. of Spalato and opposite the Gulf of Manfredonia in Italy. It is surrounded with strong walls, and has a very picturesque appearance when seen from the sea. It contains several striking and interesting buildings, chief among them being the palace of the rectors (chief magistrates), built in the Gothic and Classic Renaissance styles between 1435 and 1464; the custom house and mint, dating from before 1312 and finished in 1520; the Dominican church (1306) and monastery (1348), the former containing a picture by Titian; the Franciscan church and monastery (1317); the Church of St. Biagio (Blaise), the patron saint of the town, built in 1348-1352, but rebuilt in 1715; and the churches of San Salvatore and Alle Dancé. The old cathedral, which tradition says was founded by Richard I. of England when on his way home from Palestine, was destroyed by the earthquake of 1667; its modern successor (1671-1713) possesses some valuable silver ornaments and curiosities. There is also a large Jesuits' church (1699-1725). The harbor is

small and now sanded up. Merchandise is landed and embarked at the harbor of Gravosa, a short distance to the N.

The city seems to have been colonized by refugees from Epidaurus (now Old Ragusa, a few miles to the S. E.), Salona, and other Græco-Roman towns destroyed by the Slav invaders of the Balkan peninsula. For some centuries Ragusa was a Roman outpost on the edge of the Slav States, and flourished greatly under the suzerain protection of Byzantium. Toward the end of the 12th century Ragusa was made to acknowledge the supremacy of Venice, though she retained a large share of autonomy. In 1358 Venice ceded her Dalmatian possessions to Hungary, and from that time down to the era of the Napoleonic wars Ragusa was generally accustomed to look to Hungary (*i. e.*, the German empire) for help against her enemies, though from the beginning of the 15th century she was a free and independent republic. It was at the same time that she began to take a prominent place among the trading States of the Mediterranean, her prosperity being due to her position between the Christian powers and the empire of the Turks, and the privileges she enjoyed of trading freely with the subjects of the Sultan. Her "argosies" (*i. e.*, "vessels of Ragusa": see ARGOSY) traded as far as the Baltic; and a contingent joined the great Armada when it set sail for the invasion of England. Ragusa was the home from the middle of the 15th century of a remarkable literary movement, stimulated by the Renaissance (see SERBIA). During the course of the Napoleonic wars the French entered the city in 1805; this led the Russians to bombard the place. But in 1808 Napoleon declared the republic of Ragusa to be at an end, and in the following year incorporated it in the kingdom of Illyria. Since 1814, like the rest of the Dalmatian seaboard, it has belonged to Austria. Ragusa had, however, long before this declined from her former greatness. Though spared the attacks of foreign foes, she suffered repeatedly from fires, plagues, and earthquakes. The earthquake of 1667 was particularly disastrous. Pop. (1900) 13,174.

Ragusa, Duke of. See MARMONT.

Ragwort, the *Senecio jacobæa*, a tall, erect, glabrous or somewhat cottony plant, with pinnatifid or irregularly twice pinnatifid leaves, and densely corymbose, rayed, bright yellow flowers. Common by roadsides and in pastures, it is known by various other names. See SENEIO.

Rahu, in Indian mythology, the demon who is imagined to be the cause of the eclipses of sun and moon.

Rahway, a city in Union co., N. J.; on the Rahway river, and on the Pennsylvania railroad, 19 miles S. W. of New York. The

city has a public library, high school, about 20 churches, several banks, and a number of weekly newspapers. It has manufactures of railroad signals, carriages, printing presses, hubs and spokes, clothing, and shoes, a large printing and bookbinding establishment, and an assessed property valuation of over \$3,000,000. Pop. (1890) 7,105; (1900) 7,935; (1910) 9,337.

Raian Mœris, a lake basin, or ancient storage reservoir, in the Fayum, Middle Egypt. It is long since dried up, but the statements of Herodotus, Strabo, and others show that the Nile had been regulated by utilizing a depression in the desert corresponding in shape and situation to the Raian basin. A proposal to reconstruct this reservoir, by means of which an immense area might be brought under irrigation, engages attention. See MÆRIS, LAKE.

Raiatea, one of the Society Islands in Southeastern Polynesia; area, 75 square miles; pop. 1,400, who have been converted to Christianity by English missionaries, and are governed by their own chiefs.

Rai Bareli, or **Rai Bareilly**, a town of Oudh, India; 48 miles S. E. of Lucknow; has a large brick fort (15th century), a magnificent palace and tomb of a former ruler, and some fine mosques. Pop. (1891) 18,798.

Raibolini, Francesco. See FRANCIA.

Raiidæ, the family of fishes to which the rays (skate, etc.) belong. See RAY.

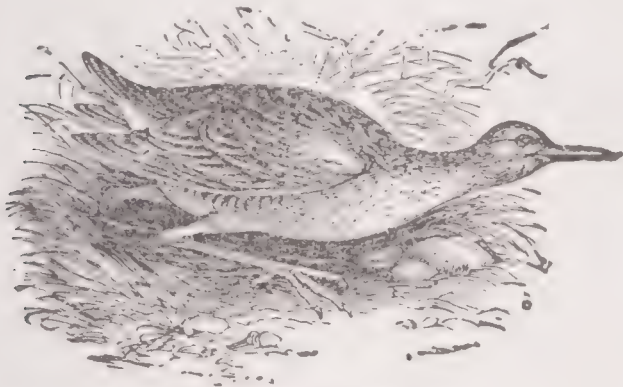
Raiffeisen, Friedrich Wilhelm, a member of the Prussian civil service; born in Hamm-on-the-Sieg, March 30, 1818. He is known as the founder of the agricultural banks on a principle similar to the people's banks of SCHULZE-DELITZSCH (*q. v.*) now found all over Germany, Austria, Switzerland, and Italy. He wrote several books in exposition of the system. He died March 11, 1888.

Raikes, Robert, an English philanthropist, the originator of Sunday-schools; born in Gloucester, England, Sept. 14, 1735. His father was printer and proprietor of the Gloucester "Journal," and he succeeded to the business, keeping it till 1802. His pity for the misery and ignorance of many of the children in his native city led him, about 1780, to start a school where they might be taught to read and to repeat the Catechism. Accounts of the scheme in the columns of his journal attracted attention, the movement grew, and Raikes himself lived to see his schools widely spread over England. He died April 5, 1811, and was buried in the church of L'Mary de Crypt, Gloucester, all the children that attended his funeral being given by his directions a shilling and a plum cake.

Rail, the common name of the *Rallidæ*, a family of grallatorial birds comprehend-

Railroad

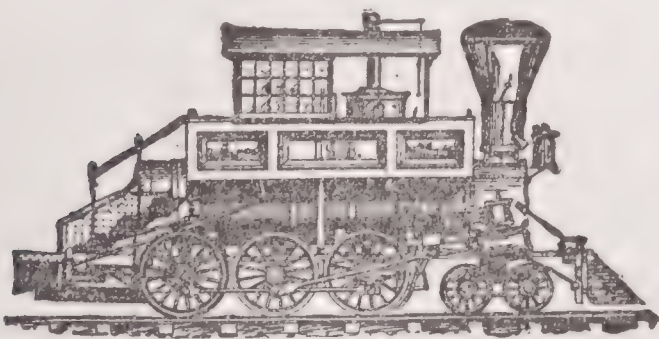
ing the rails proper (*Rallus*), the coots, water-hens, and crakes. They are characterized by possessing a long bill, which is more or less curved at the tip and compressed at the sides, by having the nostrils in a membranous groove, the wings of moderate length, the tail short, the legs and toes long and slender, the hind toe placed on a level with the others. Most of the members of the family are aquatic or frequent marshes; but some, as the crakes, frequent dry situations. The principal species of the



WATER RAIL.

genus *Rallus* are the water rail of Europe (*R. aquaticus*), about 11 inches in length, of an olive brown color, marked with black above, and of a bluish-ash color beneath, with white transverse markings on the belly, much esteemed for the table; the Virginian rail of the United States (*R. virginianus*), somewhat smaller than the water rail of Europe; and the great-breasted rail or freshwater marsh hen (*R. elegans*), about 20 inches long, which inhabits the marshes of the Southern States of the United States. The land rail, so named, is the CORN CRAKE (*q. v.*).

Railroad (the usual form in the United States), or **Railway** (the European form), a road or way provided with rails of iron or steel, on which the wheels of the cars run in order to lessen the friction. The "rails" were originally of timber, laid straight and parallel on transverse sleepers, and secured



EARLY LOCOMOTIVE.

with pegs of wood, the sleepers being imbedded in the material of the roadway; the wheels had flanges on one side of the periphery to confine them to the track. The roadway was scantling, five by seven, pegged

Railroad

down to oak sleepers, four by eight, six feet long, and laid two and a half feet apart. The track for the horses was filled in with ashes above the sleepers. Such roads were first laid near Newcastle, England, in 1602. About 1716, the wooden ways were capped with thin plates of malleable iron, having flanges along one side. Cast-iron bars were substituted in 1767. The modern railway consists of one or more series of iron or steel rails, laid parallel and continuously at a certain distance or width from each other, called the gauge. One pair of parallel rails constitutes a single track of railway, two pairs a double track, and so on. The first railway opened in England was that from Stockton to Darlington (Sept. 25, 1825), the second that from Liverpool to Manchester (Sept. 15, 1830). Railway development in the United States has had to adapt itself to the needs of a new and rapidly growing country, a large part of which was first made available for settlement by railways. Three locomotives were imported from England in 1829, and the first trial in America took place Aug. 8, 1829, at Honesdale, Pa. The first railway constructed to be worked by locomotives was the South Carolina railroad (1826-1830), though trials of an experimental locomotive had been made before on the Baltimore and Ohio railroad, which continued to be worked by horsepower till 1832. The mileage of railway construction about kept pace with that of Great Britain till 1850; at the beginning of 1885 it amounted to 125,379 miles. The mileage completed amounted to 40 miles at the end of 1830, to 3,361 miles in 1841, and to 5,206 miles in 1847, of which 1,350 miles had been opened within six years. Then there was a sudden and great increase, the yearly additions for seven years being 1,056 miles in 1848,



LOCOMOTIVE PETER COOPER.

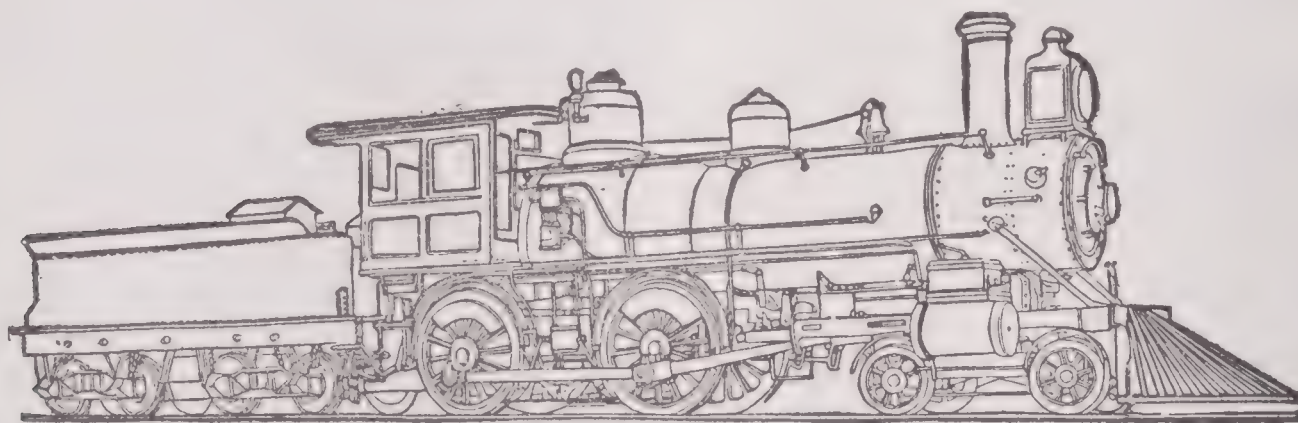
1,048 in 1849, 1,261 in 1850, 1,274 in 1851, 2,288 in 1852, 2,170 in 1853, 3,442 miles in 1854. The Civil War checked railway construction, only 3,257 miles being opened during the five years ending with 1865,

Railroad

when the aggregate amounted to 32,996 miles. Between 1865 and 1873, the mileage increased more than 100 per cent. including one road in operation and a second line in progress of construction to the Pacific coast. The greatest increase of this period was in the Western and Southwestern States, in which fully 25,000 miles of trackage were made ready for traffic. At the close of 1873 the total capital invested in railroads of the United States aggregated \$3,784,543,034, of which \$1,836,904,450 represented the bonded indebtedness. The depression which followed the panic of that year continued till 1879. In the latter year the construction again increased 100 per cent., and between 1874 and 1888, there were built 85,814 miles of new railroad. Since the revival of railroad construction in 1879 there have been completed sufficient miles of road to give a total length of 250,362 miles. This does not include the elevated steam and

Railroad

laid transversely (see SLEEPER). The rails on English railways are, in most instances, supported at short intervals by cast-iron frames, called chairs, which are fastened firmly by spikes to the sleepers, and in which the rails are firmly secured by wooden blocks, called keys. Where flange-rails are used there are no chairs, the rails being attached direct to the sleepers. Transverse sleepers are laid at a distance of from two feet six inches to three feet from center to center. The rails are joined at their extremities generally by fish-joints. In order to allow trains to pass each other, or to pass from one line to another, sidings and junctions are constructed. Sidings are generally used for freight cars or trains to remain in temporarily while being loaded or unloaded, or while another train is allowed to pass on the line of rails on which the first train is proceeding. The change from one line of rails to another at a junction is



MODERN AMERICAN LOCOMOTIVE.

electric railroads in the various large cities of the country.

Construction.—A railway, as a general rule, is carried in as straight a line from point to point as the nature of the country and the necessities of local and intermediate traffic will allow. It is carried over valleys by embankments or viaducts, over rivers and roads by bridges, and through hills or elevated ground by deep trenches, technically called cuttings, or by tunnels. When the material excavated is insufficient for the embankments, recourse is had to side cuttings, that is, to widening the cuttings, so as to obtain extra material to supply the deficiency. A perfect railway would be one laid on a level line, but as this is not always possible owing to the inequalities in the country traversed, or the difference of levels of the places to be connected, the line follows the level of the country traversed, rising and falling according to circumstances. These slopes or inclines of the line are called its gradients, and the whole arrangement of inclines is called the grading of the line. The way or track of the railway is laid with clean gravel or broken stones, called ballast, and in this the sleepers are

effected by means of points or switches, and the process of turning a train into a siding or from one line to another is termed shunting, or switching. When a railway is thus completed, the work is called the permanent way. The extremities of a railway are called its termini, and the various places, provided with offices, etc., along the line where trains stop for passengers or freight are termed stations or depots.

Motive Power.—The motive power usually employed on railways in drawing the trains is steam. Attempts have also been made, but not very successfully, to utilize atmospheric pressure as a motive power (see ATMOSPHERIC RAILWAY). In a few other cases a fixed engine is employed to draw the carriages, etc., along by means of an endless rope running over pulleys, or of one which winds and unwinds on a cylinder. Such engines are known as stationary engines, and the system, which is in very successful operation, is known as the "cable system." Electricity is also employed as a motive power on many short lines (see ELECTRIC RAILWAY).

Single-Rail System.—Ever since the railroad became a necessity in the life of civ-

ilized nations the invention of a feasible plan by which a railroad could be constructed and operated, using a single rail, has been the hope of many engineers of the highest attainments. Several single-rail roads have been devised and some of them have been tested with indifferent success; but cheapness in construction, rapidity in the moving of trains and reduction in cost of operation have made the single rail especially desirable in solving many of the perplexing problems in transportation. Since the greatly increased use of electricity as a motive power the exertions of engineers to hit on a safe, cheap and practical road using one rail have been redoubled and they have finally been successful. The credit of this discovery, or invention, belongs to an Englishman named Behr, who has put his plan into successful operation in Belgium, over a short line of road near Tervuerne, over which he has moved his trains at the rate of two miles a minute, the cars being of ordinary size, capable of seating 100 passengers. The invention has attracted the attention of practical railroad men.

The trains run on a single rail, supported on a trestle some feet from the ground, which avoids the necessity of an ordinary roadbed of earth. The cars are 60 feet in length, suspended from the rail and kept in

place by guide wheels that bear upon the top and sides of the rail. Each car has four electric motors, weighing three tons each, supplied by a contact rail, laid parallel with the track, having 150 horsepower each and capable of 600 revolutions, each of which would give the car a speed of 100 miles an hour, and this speed is capable of being indefinitely increased. From the contact rail electricity is conveyed to the motors in the car by copper wires. The cost of this mono-railroad is estimated at from \$50,000 to \$100,000 a mile, which is considerably more than that of the ordinary surface double-rail road, but the inventor claims that the greatly reduced expense of operating the former will far more than compensate for the increased cost of construction. The invention has passed beyond the experimental stage, and while all that is claimed for the new system may not be immediately realized there is little doubt that it marks a very long advance in the solution of the problem of rapid transit for long distances.

Statistics.—The following shows the mileage, assets, liabilities, earnings, expenditures, and traffic of surface steam railroads in the United States, compiled from "Poor's Manual of Railroads of the United States for 1901":

Mileage of Railroads.....	192,161.93	Passenger Train Mileage.....	373,226,581
Second Tracks and Sidings.....	65,691.29	Freight " "	513,667,388
		Mixed " "	20,702,172
Total Track	257,853.22	Total	907,596,141
Steel Rails in Track.....	239,629.13	Passenger Mileage.....	16,313,284,471
Iron Rails in Track.....	18,224.09	Passengers Carried	584,695,935
Locomotive Engines, Number.....	38,065	Tons of Freight Moved.....	1,071,431,919
Cars, Passenger	26,786	Freight Mileage	141,162,109,413
" Baggage, Mail, etc.....	8,209	TRAFFIC EARNINGS.	
" Freight	1,350,258	Passengers	\$331,402,816
Total Cars	1,385,253	Freight	1,052,835,811
		Miscellaneous	117,456,751
LIABILITIES.		Total Traffic Revenue.....	\$1,501,695,378
Capital Stock	\$5,804,346,250	Net Earnings	\$483,247,526
Bonded Debt	5,758,592,754	Receipts from Other Sources.....	67,772,934
Unfunded Debt	328,963,335	Total Available Revenue	\$551,020,460
Current Accounts	422,262,823	PAYMENTS.	
Sinking and Other Funds.....	114,800,860	Interest on Bonds.....	\$214,199,502
Total Liabilities	\$12,428,966,022	Other Interest	6,315,028
ASSETS.		Dividends on Stock.....	119,288,879
Cost of Railroad and Equipment..	\$10,484,430,907	Miscellaneous	46,153,433
Other Investments	1,766,493,090	Rentals—Interest	30,248,304
Sundry Assets	328,994,626	Dividends	21,054,774
Current Accounts	188,992,213	Miscellaneous	21,200,651
Total Assets	\$12,768,910,837	Total Payments	\$458,460,571
Excess of Assets over Liabilities..	\$339,944,815	Surplus	\$92,559,889
Miles of Railroad Operated.....	191,861.96		

COMPARATIVE STATISTICS OF RAILROADS IN THE UNITED STATES, 1890-1900.

YEAR	Miles Oper't'd	Capital Stock.	Bonded Debt	Gross Earnings.	Net Earnings.	Interest Paid.	Dividends Paid.
1890	163,420	\$4,640,239,578	\$5,105,902,025	\$1,097,847,428	\$343,921,318	\$229,101,144	\$83,863,632
1891	164,324	4,809,176,651	5,235,295,074	1,138,024,459	356,209,880	231,259,810	90,719,757
1892	170,668	4,920,555,225	5,463,611,204	1,204,915,204	358,638,520	232,569,089	95,662,412
1893	173,433	5,080,032,904	5,570,292,613	1,222,618,290	364,591,109	239,616,284	95,337,681
1894	175,508	5,075,629,070	5,665,734,249	1,080,305,015	322,539,276	237,620,367	85,278,669
1895	179,887	5,231,373,852	5,712,052,517	1,105,284,267	327,505,716	242,943,243	83,175,774
1896	180,891	5,290,730,567	5,426,074,969	1,125,632,025	332,333,756	242,415,494	81,364,854
1897	181,133	5,453,782,046	5,411,058,525	1,132,866,626	338,170,195	231,046,819	82,630,989
1898	184,194	5,581,522,858	5,635,363,594	1,249,558,724	389,666,474	237,133,099	94,937,526
1899	186,280	5,742,181,181	5,644,858,027	1,336,096,379	423,941,689	239,178,913	109,032,252
1900	191,511	5,804,346,250	5,758,592,754	1,501,695,378	483,247,526	244,447,806	140,348,653

Railroad

Railroad

Accidents.—The following is a table of accidents in the United States:

YEAR ENDING JUNE 30.	EMPLOYEES.		PASSENGERS.		OTHER PERSONS.		TOTAL.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
1893.....	2,727	31,729	299	3,229	4,320	5,435	7,346	40,393
1894.....	1,823	23,422	324	3,034	4,300	5,433	6,447	31,889
1895.....	1,811	25,696	170	2,375	4,155	5,677	6,136	33,748
1896.....	1,861	29,969	181	2,873	4,406	5,845	6,448	38,687
1897.....	1,693	27,667	222	2,795	4,522	6,269	6,437	36,731
1898.....	1,958	31,761	221	2,945	4,680	6,176	6,859	40,882
1899.....	2,210	34,923	239	3,442	4,674	6,255	7,123	44,620
1900.....	2,550	36,643	249	4,128	5,066	6,549	7,865	50,320

The total number of passengers carried in 1900 was 576,865,230, as against 523,176,508 in 1899, 501,066,681 in 1898, 489,445,198 in 1897, 511,772,737 in 1896, 507,421,362 in 1895, and 540,688,199 in 1894.

Mileage by States, etc.—

STATE OR TERRITORY	MILEAGE ON JUNE 30, 1900			STATE OR TERRITORY.	MILEAGE ON JUNE 30, 1900.		
	Official.	Unof- ficial.	Total Mileage.		Official.	Un- official.	Total Mileage.
Alabama.....	4,219.29	6.55	4,225.84	New Jersey.....	2,237.39	19.30	2,256.69
Alaska.....	.....	.....	.....	New Mexico.....	1,752.52	.....	1,752.52
Arizona.....	1,511.89	.....	1,511.89	New York.....	8,121.03	.....	8,121.03
Arkansas.....	3,341.61	18.25	3,359.86	North Carolina.....	3,808.16	23.00	3,831.16
California.....	5,744.04	7.00	5,751.04	North Dakota.....	2,731.22	.....	2,731.22
Colorado.....	4,587.25	.....	4,587.25	Ohio.....	8,774.97	32.30	8,807.27
Connecticut.....	1,023.62	.....	1,023.62	Oklahoma.....	827.88	.....	827.88
Delaware.....	346.72	.....	346.72	Oregon.....	1,723.80	.....	1,723.80
Dist. of Columbia..	31.75	.....	31.75	Pennsylvania.....	10,277.37	53.13	10,330.50
Florida.....	3,272.06	27.00	3,299.06	Rhode Island.....	211.79	.....	211.79
Georgia.....	5,639.22	12.50	5,651.72	South Carolina.....	2,794.93	23.00	2,817.93
Idaho.....	1,261.23	.....	1,261.23	South Dakota.....	2,849.83	.....	2,849.83
Illinois.....	10,997.33	5.60	11,002.93	Tennessee.....	3,124.22	12.73	3,136.95
Indiana.....	6,469.61	1.00	6,470.61	Texas.....	9,873.39	13.10	9,886.49
Indian Territory...	1,322.75	.....	1,322.75	Utah.....	1,547.42	.....	1,547.42
Iowa.....	9,180.65	4.53	9,185.18	Vermont.....	1,012.11	.....	1,012.11
Kansas.....	8,719.36	.....	8,719.36	Virginia.....	3,729.05	50.10	3,779.15
Kentucky.....	3,059.99	.....	3,059.99	Washington.....	2,890.57	23.00	2,913.57
Louisiana.....	2,824.08	.....	2,824.08	West Virginia.....	2,198.27	29.78	2,228.05
Maine.....	1,915.24	.....	1,915.24	Wisconsin.....	6,496.52	34.00	6,530.52
Maryland.....	1,376.16	.....	1,376.16	Wyoming.....	1,228.63	.....	1,228.63
Massachusetts.....	2,118.58	.....	2,118.58				
Michigan.....	8,193.18	2.00	8,195.18	Grand total in U. S. 1900	192,940.67	405.11	*193,345.78
Minnesota.....	6,942.57	.....	6,942.57	Grand total in U. S. 1899	188,277.49	1,017.17	189,294.66
Mississippi.....	2,919.90	.....	2,919.90	Grand total in U. S. 1898	185,370.77	1,025.55	186,396.32
Missouri.....	6,867.80	7.24	6,875.04	Grand total in U. S. 1897	182,919.82	1,508.65	184,428.47
Montana.....	3,010.32	.....	3,010.32	Grand total in U. S. 1896	181,153.77	1,622.86	182,776.63
Nebraska.....	5,684.85	.....	5,684.85	Grand total in U. S. 1895	179,175.51	1,481.96	180,657.47
Nevada.....	909.35	.....	909.35	Grand total in U. S. 1894	176,602.61	2,105.94	178,708.55
New Hampshire.....	1,239.20	.....	1,239.20	Grand total in U. S. 1893	170,332.30	6,128.77	176,461.07

Excludes 21.80 miles in Alaska.

British Railways.—The following summary is from the "Railway Age":

The railway returns for England and Wales, Scotland, and Ireland, for the year 1900, issued by the Board of Trade under date of July, 1901, show the following figures for the United Kingdom at the end of 1900: Railway lines open for traffic, 21,855 miles; number of passengers carried (exclusive of season ticket holders), 1,142,276,686; weight of goods and minerals conveyed, 424,929,513 tons; total paid-up capital, £1,176,001,890; gross receipts, £104,801,858; working expenses, £64,743,520; net receipts, £40,058,388. Compared with 1899 there is shown an increase of 155 miles of line; of 35,584,695 in passengers carried and of 11,306,488 in tons carried; an increase of £23,784,389 in capital, of £3,134,791 in gross receipts, and of £4,652,833 in working expenses, and a decrease of £1,518,040 in net receipts. Ten years ago the percentage of net receipts to total paid-up capital was 4.10; last year it was 3.41. The steady increase in the percentage of working expenses to gross receipts is remarkable. Commencing with 1850, when it was 47 per cent., the opening years of the successive decades show these figures: 48, 51, 53, 54, 56, 59, 62. No dividends were paid last year on capital aggregating £83,795,700. On the remainder the dividends ranged from 1 up to as high as 10 per cent., the amount of stock earning above 6 per cent., however, being comparatively insignificant.

Railways of the World.—The following statement by "Archiv fur Eisenbahnwesen"

represents the world's railway mileage at the beginning of 1900:

Countries.	Miles.
All of Germany	31,392
Austro-Hungary (including Bosnia, etc.)...	21,545
Great Britain and Ireland.....	22,671
France	26,234
Russia (including Finland).....	28,589
Italy	9,772
Belgium	3,850
Netherlands (including Luxembourg)....	1,982
Switzerland	2,343
Spain	8,254
Portugal	1,476
Denmark	1,765
Norway	1,231
Sweden	6,665
Servia	359
Rumania	1,920
Greece	604
European Turkey, Bulgaria, and Rumelia..	1,901
Malta, Jersey, Man.....	68
Total, Europe	172,621
United States	189,295
British North America	17,250
Newfoundland	593
Mexico	8,505
Central America	647
Total, North America	216,290
United States of Colombia	346
Cuba	1,134
Venezuela	634
San Domingo	117

Railroad

Brazil	9,197
Argentina	10,015
Paraguay	157
Uruguay	998
Chile	2,792
Peru	1,037
Bolivia	622
Ecuador	186
British Guiana	21
Jamaica, Barbados, Trinidad, Martinique, Porto Rico, Salvador	618
Total, South America and West Indies..	27,874
British India	22,491
Ceylon	297
Asia Minor and Syria	1,715
Russia (Transcaspian District).....	1,659
Siberia	3,747
Persia	34
Dutch India	1,294
Japan	3,635
Portuguese India	51
Malay Archipelago	209
China	401

Railroad

Siam	167
Cochin China, Pondicherry, Malacca, and Tonquin	238
Total, Asia.....	35,938
Egypt	2,087
Algiers and Tunis	2,642
Cape Colony	2,937
Natal	737
South African Republic	1,203
Orange Free State.....	597
Mauritius, Reunion, Congo, Senegal, and other States	2,298
Total, Africa	12,501
Australasia	14,675
Recapitulation:	
Europe	172,622
North America	216,290
South America	27,874
Asia	35,938
Africa	12,501
Australasia	14,675
Total	479,900

Railroad Traffic of the World.—This ta-
ble is by Mulhall, and represents the busi-

ness transacted by the railroads in the
year 1897:

COUNTRIES.	Miles of Rail- road.	Cost of Roads and Equipments.	Passengers Carried.	Tons of Freight Carried.	Receipts.	Expendi- tures.
Europe.....	161,200	\$18,335,000,000	2,460,000,000	1,043,000,000	\$1,640,000,000	\$945,000,000
America....	232,060	14,570,000,000	610,000,000	820,000,000	1,305,000,000	910,000,000
Africa.....	8,580	515,000,000	24,000,000	7,000,000	46,500,000	23,500,000
Asia.....	26,150	1,375,000,000	226,000,000	38,000,000	110,000,000	55,000,000
Australia...	14,210	725,000,000	60,000,000	12,000,000	53,500,000	31,500,000
Total.....	442,200	\$35,520,000,000	3,380,000,000	1,920,000,000	\$3,155,000,000	\$1,865,000,000

Railroad Speed.—The following list of
notable fast runs of passenger trains for

long distances is from the “World Al-
manac”:

Date.	Railroad.	Terminals.	Dis- tance, Miles.	Inclusive.		Stop- Num- ber.
				Time, H. M.	Miles per Hour.	
May, 1848	Great Western (England).....	London — Didcot	53.25	0.47	68	..
July, 1885	West Shore	East Buffalo — Frankfort	201.7	4.00	50.4	..
Aug., 1888	London, N. W. & Caledonian...	London — Edinburgh	430.32	7.19.5	59.56	3
Sept., 1891	New York Central & H. R.	New York — East Buffalo	400	7.38	52.4	3
Nov., 1892	New York Central & H. R.*...	Syracuse — Utica	51.67	0.46	67.38	0
Nov., 1892	New York Central & H. R.*...	Chittenango — Schenectady ...	116.16	1.50	63.38	0
May, 1893	New York Central & H. R.*...	Syracuse — Rochester	80.38	1.11	68.45	0
May, 1893	New York Central & L. S.	New York — Chicago	964	19.57	48.20	10
Aug., 1894	Plant system, A.C. L., Pa. R. R.	Jacksonville — Washington	760.9	15.49	49.37	34
Apr., 1895	Pennsylvania	Camden — Atlantic City.....	58.3	0.45¾	76.50	0
Aug., 1895	London & Northwestern.....	London — Aberdeen	540	8.32	63.28†	3
Sept., 1895	New York Central & H. R.	New York — Buffalo	436.50	6.47	64.33†	2
Sept., 1895	N. Y. Central “World Flyer”..	Albany — Syracuse	148	2.10	68.3	0
Oct., 1895	Lake Shore & Mich. Southern..	Chicago — Buffalo	510	8.1	65.7‡	5
Feb., 1897	Chicago, Burlington & Quincy..	Chicago — Denver	1,025	18.52	58.74	20
Mar., 1897	Central R. R. of New Jersey...	Jersey City — Washington ...	231	4.8	60	(a)
Apr., 1897	Lehigh Val., Black Diamond Exp.	Alpine, N. Y.,—Geneva Jc., N.Y.	43.96	0.33	80	0
Aug., 1897	Union Pacific	North Platte — Omaha	291	4.39	63.49	..
May, 1898	Chicago & Alton.....	Willow Spring — Springfield...	168.1	2.46	60.7	..
July, 1898	Lehigh Val., Black Diamond Exp.	Sayre — Buffalo	177	2.59	59.32	2
Oct., 1899	Burlington Route	Fleming — Jacksonville	149	2.10	68.8	1
May, 1900	Burlington Route	Mendota — Clyde	74.3	0.65	68.58	..
Dec., 1900	Burlington & Mo. River.....	Burlington — Chicago	205.8	3.08¾	65.5§	..
Mar., 1901	Sav., Fla. & Wes. (Plant System)	Ravenna — Seneca	130	2.5	66	(b)

* By “Empire State Express.” † Including stops. § Excluding stops. ‡ Exclusive of stops, or 63.61 miles per hour including stops. Made the trip from Chicago to New York, 952 miles, in 17 hours 45 minutes 23 seconds (or 54.20 miles per hour, including 10 stops). (a) Including “slow-ups” for taking water, changing engines, etc. (b) A delay of 7 minutes at Anselmo should be deducted from running time.

Date.	Railroad.	Terminals.	Dis- tance, Miles.	Time, M. S.	Miles per Hour.
July, 1890	Phil. & Reading.....	Skillmans — Belle Meade	4.1	2.30	98.4
Aug., 1891	Phil. & Reading.....	Somerton —	1	0.39.8	90.5
Nov., 1892	Central of New Jersey.....	Fanwood — Westfield, N. J.	1	0.37	97.3
May, 1893	N. Y. Central & H. R.	Grimesville —	1	0.35	102.8
May, 1893	N. Y. Central & H. R.	Crittenden—“Empire State Exp.”	1	0.32	112.5
Aug., 1895	Pennsylvania	Landover — Anacosta	5.1	3.00	102
Aug., 1898	Wabash	Boody — Blue Mound	6	4.7	87.46
Jan., 1899	Burlington Route	Siding — Arion	2.4	1.20	130(c)
Mar., 1901	Plant System	Run from Fleming to Jacksonville.	5	2.30	120

(c) Four stop watches caught the time, but there was no speed indicator on the engine. The fastest time on record for a distance of over 440 miles was made by the Lake Shore and Michigan Southern R. R. from Chicago to Buffalo, in October, 1895. The fastest long-distance run less than 440 miles was on the New York Central R. R., Sept. 11, 1895, from New York to Buffalo, 436½ miles, in 407 minutes actual time.

The fastest regular trains in the United States, for a shorter distance, are believed to be the New York Central "Empire State Express" between New York and Albany, 143 miles in 160 minutes, and those between Washington and Baltimore, on the Baltimore and Ohio Railroad, 40 miles in 45 minutes, a speed of 53.33 miles an hour. The run from Washington to New York, 225.3 miles, is made in 5 hours. Deducting 12 minutes for the Jersey City Ferry, and 10 minutes for the Canton Ferry, the rate of speed is 48.6 miles per hour. The "Congressional Limited," on the Pennsylvania Railroad, makes the run from Jersey City to Washington in 4 hours 46 minutes, and the distance is 227 miles.

The quickest run between Jersey City and Washington, 231 miles, was made on the Central Railroad of New Jersey, March 2, 1897 (by a special train, bearing Vice-President-elect Hobart and party), in 4 hours 8 minutes. This beat the time of the "Aunt Jack" train, made by the Madison Square Theater Company, March 10, 1890, which was 4 hours 18 minutes, each way, going and returning.

The fastest long-distance trains of the world, including all stops and slacks, are according to the "Railroad Gazette," as follows:

ROUTE.	Railways.	From	To	Miles.	Time— Hrs. Min.	Stops	Inclusive Speed in Miles per Hour.
Sud Express...	Orleans and Midi	Paris.....	Bayonne..	486¼	8 59	6	54.13
Empire State Ex	N. Y. C. and H. R	New York.	Buffalo....	440	8 15	4	53.33
East Coast.....	Gt. N. and N. E.	London....	Edinburgh.	393½	7 45	3	50.77
West Coast....	L. & N. W. and Cal	London...	Glasgow...	401½	8 00	3	50.18

Of long-distance runs in France one is made on the Northern Railway of France by the Paris-Calais express, which runs 185 miles in 184½ minutes, or a fraction over a mile a minute, allowing for a stoppage of 2½ minutes at Amiens.

The Jarrett and Palmer special theatrical train, Jersey City to Oakland (San Francisco), 3,311 miles, June, 1876, made the fastest time between the oceans—83 hours 45 minutes; average speed, 39.53 miles per hour.

Railroad Accidents. The reports of the Interstate Commerce Commission show many interesting facts and some unfortunate ones—for instance, the deaths and injuries on railways. Of passengers, 249 were killed in the United States in 1901—about one to every two and a third millions of tickets taken. Although this is a slight increase over the number for preceding years, railway travel is pretty safe for passengers; for doubtless more than 250 people during the year fell out of windows and broke their necks. Yet 4,128 passengers were injured—a number which indicates a still disquieting degree of danger. But the danger to employees is yet very great; for of these, 2,550 were killed (one out of every 137), and 39,643 were

injured (one out of every 11). This ratio of deaths and injuries to the number of men employed has for several years shown an increase. It is, therefore, yet a hazardous service. The ingenious labor and the expense that have been spent in the problems of lessening these dangers have reduced them far lower than they once were. The number of "other persons" killed is 5,066, and 6,549 of this class were injured.

Railroad Consolidation. Nearly 80,000 miles of railroad in the United States, as a result of the recent as well as previous consolidations, have come under the ownership or control of five financial powers. The five groups so formed are remarkably uniform in size. The subjoined table will give the groups, their component parts, and the individual and collective mileage.

I. VANDERBILT GROUP.		II. PENNSYLVANIA GROUP.		III. GOULD GROUP.		IV. KUHN-LOEB- HARRIMAN GROUP.		V. MORGAN GROUP.	
Road	Mile- age.	Road	Mile- age.	Road	Mile- age.	Road	Mile- age.	Road	Mile- age.
N. Y. Cent..	2,828	Penn. Sys- tem	9,237	Mo. Pacific..	5,324	Union Pacific	2,421	Reading	2,891
L. S. & M. Southern	1,413	Buff., Roch. & Pitts....	650	Tex. Pacific.	1,413	Ore. R. R. & Nav.	1,059	Lehigh Val..	1,404
N. Y., Ch. & St. Louis.	523	West. N. Y. & Penn....	633	St. L. South western ..	1,258	Ore. Short Line	1,438	Erie	2,271
Mich. Cent..	1,200	Ches. & O..	1,476	Int. & Great Northern .	825	Ch. & Alton.	843	Cent. of N. J.	677
Can. South- ern	457	Norf. & West.	1,552	Denv. & Rio Grande ...	1,674	So. Pacific..	7,417	Ch., Ind. & Louisv. ...	508
Lake Erie & West.	725	B. & O. Sys- tem	3,156	Mo. Kans. & Tex.	2,361	Kans. City Southern .	887	Southern Ry.	5,377
Big Four Sys- tem	2,287	Long Island.	668	Wabash	2,360	Ch. Termi. Trans.	93	Mobile & O.	687
Dela., Lack. & West....	900		17,372		15,215		14,158		15,715
Ch. & North- west	5,562								
Ch., St. P., Minn. and Omaha ...	1,532								
	17,427								

RAILROAD.



THE PENNSYLVANIA'S "PENNSYLVANIA SPECIAL."



THE N. Y. CENTRAL'S "TWENTIETH CENTURY LIMITED."

(From official photographs.)

Railroad Operation, Economy of. The history of the railroad is almost coincident in time with the 19th century itself; for though rails had been laid in coal mines for a long time previous, the first railroad intended for general traffic was chartered in 1800. This was a line from Wandsworth to Croydon, in the suburbs of London, and was operated by horses. During the years which immediately followed, a number of similar lines were constructed in different parts of England. The first step toward the use of steam instead of horse power was made in 1814 by the discovery that cars could be propelled by the adhesion of a smooth wheel to a smooth rail. Inventors at once set themselves to work on the problem of generating the power to move such a wheel in a locomotive engine. For this purpose two things were needed,—a very hot fire and a large heating surface. The invention of the tubular boiler provided the latter; the use of an escape steam blast to secure a strong draught provided the former. The combination of the two by George Stephenson produced the modern locomotive, complete in all its essential features. The first actual use of the locomotive was on the Stockton and Darlington railway in 1825. It was first applied on a large scale as a motive power for handling general traffic on the Liverpool and Manchester railway five years later. America was quick to follow the example of England in its use. The Baltimore and Ohio railroad, chartered in 1827, opened in 1830, after brief experiments with horse power and even with sails, soon chose steam as the best motive power. Steam railroads were built almost simultaneously in the neighborhood of Boston, in the coal regions of Pennsylvania, in the neighborhood of Albany, and in South Carolina. All through the early years of railroad enterprise there was active emulation between England and the United States as to which country should equip itself most rapidly with railroads. The developments of the electric telegraph a few years later greatly increased the efficiency and safety of railroad running, and gave a new impetus to the growth of the industry.

In matters of invention which concerned the permanent way, England took the lead. Her abundance of capital, her density of traffic, and the habits of solid construction in which her engineers had been trained caused the English track to be speedily brought to a high standard of excellence. The location was arranged to avoid grade crossings; the block signal system was developed in such a manner as to give safeguard against collisions. A little later the system of interlocking points and signals provided a similar safeguard against derailments. It was many years before the United States could even approximate its

practice to the English standards in this respect. The American traffic was so sparse that many of them were unnecessary. The capital for building American railroads was so scarce that if rigid requirements in this respect had been insisted on, we should have waited many years before we could have built them at all. To offset our deficiency in this respect, we developed a superior system of equipment. To make up for the irregularities of the track, a system of locomotive building was adopted which, without sacrifice of strength, gave greater flexibility and power to bear shocks. To make up for the greater liability to collisions and other train accidents, a system of car construction was devised with a longitudinal instead of a transverse arrangement of beams, which rendered these accidents far less disastrous when they occurred. Brake power was always more liberally used in the United States than in England; and about 1870 the invention of the air brake gave the engineer a power of control over his train vastly superior to anything which had previously existed.

The results obtained in the matter of railroad speed were for a long time not so great as the inventors of the locomotive had confidently predicted. A rate of 60 miles an hour was reached at a very early period in railroad enterprise. Beyond that, each successive increment of speed has been attended with great difficulty. For a long time nearly all the rapid running of trains was done in England, the standard of track and equipment in other countries being hardly sufficient to admit of good results in this respect. As late as 1888, a careful statistical investigation showed that the daily mileage of trains running faster than 40 miles an hour including stops was about 63,000 in England, about 14,000 in the United States, and very small indeed in the rest of the world. Since that time there has been so much gain in American roadbeds that a similar comparison at the present day would probably show the two countries on a footing of substantial equality in this respect. The most rapid regular performances for long distances—200 miles and over—are at rates of from 50 to 55 miles an hour. For short distances we find schedules arranged at rates of above 60 miles an hour, while there are individual records running as high as 90 and 100. At a point a little above the latter figure we seem to reach the physical limit of speed except on a down grade; the figures of 50 and 60 miles represent the operating limit of what is practicable and profitable under the most favorable conditions. What will be the effect of the introduction of electric motors upon train speed it is as yet too early to say.

But in all other respects except speed the railroad has far exceeded the expecta-

tions of its most sanguine advocates. To the variety of service to which it can be adapted, and to the amount of traffic which it can handle economically, there scarcely seems to be a limit. When railroads were first built it was supposed that they could be used only on level ground and for thickly settled communities. In actual experience it has been found possible to increase the gradients which can be overcome and to build mountain railroads which give access to places that could not be commercially reached by wagons. There is no space in an article like this to enumerate the feats of engineering by which successive railroads have crossed or pierced the Alps, the Rocky mountains, or the Cordilleras. Where a line of ordinary gauge cannot run, a narrow gauge road is often possible. Not that narrow gauge roads have had the economic importance which was anticipated at the time of their first development from 1870 to 1880. As a matter of commercial economy, the expense of operating a narrow gauge road outweighs the gain in cheapness of first cost. In general, a narrow gauge railroad cannot be run in competition with a standard gauge line which handles the same traffic; but where the standard gauge line cannot go at all the narrow gauge line extends the sphere of railroad influence. Still steeper gradients can be overcome by the use of the rack and pinion, which brings almost every mountain summit within the possible reach of the railroad engineer.

Instead of following in the wake of trade, railroads have become its pioneers. In countries like the United States, where there is unoccupied land, the system of land grants has made railroads a means of settlement of new territory. In countries desirous of extending the sphere of their political influence, the building of railroads in advance of commercial necessity becomes a means of strategic power. This political and semi-military use of railroads was first perceived by Prussia about 1850, when the construction of a line from Berlin toward the Russian frontier laid the foundation at once of the State railroad system of that country, and of its subsequent ascendancy in German politics. Similar political and military ideas underlay the great efforts made in the time of the Civil War to push to its completion the Union and Central Pacific railroad line, connecting two parts of the country which had previously been isolated from one another. The same cause is responsible for much of the rapid railway development in the Dominion of Canada, and still more so for that in British India. But nowhere has it been so strongly exemplified as in the modern history of Russia. The Trans-Caspian railroad, begun in 1881 and substantially completed in 1886, running from the

S. E. corner of the Caspian Sea into the very heart of what was once marked on our maps as Independent Tartary, has made Russian influence dominant in a part of the world where 20 years earlier a white man could hardly penetrate, and has rendered it possible to bring the Russian army at any time within striking distance of the N. W. frontier of British India. But this achievement has been recently thrown into the shade by the virtual completion of the Trans-Siberian railroad, extending in a practically continuous line from the Ural mountains to the Pacific Ocean, and placing Russia within reach of the theater of Asiatic conflict as no other European nation can place herself.

But more surprising even than the history of railroad construction has been the development of railroad operation, and particularly the success in cheap handling of freight. When railroads were first built it was supposed that they would find their chief use as carriers of passengers. Their freight business was expected to be at best an incidental thing—a local express business on a somewhat larger scale than had previously been possible. That railroads should handle long-distance traffic, that they should create new industries, or that they should compete effectively with water routes was not expected by anybody. It was about 1850 that the possibilities of large freight handling first dawned on railroad managers. The competition of the New York Central railroad with the Erie Canal aroused not only surprise, but severe criticism. Mass meetings were held to insist on the passage of laws which should stifle such competition. We were told that the canal had a natural right to all heavy freight; that it was suicidal folly for the railroads to try to carry it, and that their managers in so doing were ruining themselves and the stockholders whom they represented. But that which awakened surprise in 1855 was accepted as a matter of course in 1870. The canals were compelled to abolish their tolls in order to meet the competition of the railroads. The rates which seemed suicidal in 1850 or 1860 were reduced again and again; till now the trunk line freight rate for heavy goods is less than a sixth of what it was at the time when the competition began. A similar cheapening of freight transportation has made itself felt in other countries, notably Russia and British India, though not to the same degree as in the United States.

It is interesting to study the means by which this cheapening has been accomplished. First in order of time was the recognition of the economy of handling freight for long distances as compared with short ones. So large a part of the expense of railroad transportation is connected with loading and unloading, rather than

with the actual haul, that the cost of service does not increase in proportion to the distance. In fact, where freight for long hauls can be obtained with regularity, the actual expense of dealing with it may be less than that of local freight at intermediate points. But a yet more important means of cheapening is found in the series of improvements which make it possible to handle goods in larger bulk. An increase in the size of the cars increases their dead weight but slightly, and increases very greatly the quantity of goods which they can safely carry. This change began about 1870, at the time when the introduction of steel rails and the use of stronger bridges rendered heavier loading safe for the track. It has reached its highest stage of development only in these last years, with the increased use of steel in the construction of the cars themselves. A further advantage was obtained by the increase of size of locomotives. The "American" locomotive, with its two drivers on each side, has given place for freight handling to the "Mogul" with three drivers, and the "Consolidation" with four. This has increased the weight of the locomotive something like 50 per cent.; it has increased the load which they can draw three, four, and even five-fold. Finally, improvements in the track itself have enabled the new cars and new engines to be utilized with the utmost operating economy, and have made it possible, with a given amount of fuel and train service expense, to accomplish in actual hauling ten times the amount which was possible a generation ago.

The result of this has been the gradual lowering of rates per ton per mile on the railroads of the United States from more than three cents at the close of the war to three-quarters of a cent at the present day. But this cheapening has not been unattended with evil. It has given the railroads power to create traffic when they pleased and where they pleased, and by so doing to put the shippers who were not favored at the mercy of the railroad authorities. In other words, it has put in the build up one locality or one individual at the expense of another. The danger from the abuse of this power has brought into the forefront of economic discussion the question of the relations between the railroads and the government.

In the years immediately succeeding the Civil War, when discrimination was a new thing, it was exercised in the most arbitrary manner. As a natural reaction against such abuse of power, the "Granger" laws were passed in the States of the upper Mississippi valley, which attempted to fix rigidly the rates which the railroads were allowed to charge. These laws de-

feated their own purposes. By arbitrarily lowering the rates on all traffic to the level of that which was handled with exceptional advantage, they left the companies no money to pay interest. The construction of new lines was thereby checked, and the development of the whole State suffered from this stoppage. By 10 years' experience both sides had learned something; and when, about 1880, the movement was started which led to the passage of the Interstate Commerce Law, the railroads had become already less arbitrary in their charges, and the legislators less exacting in their demands. The railroads had endeavored to stop some of their more serious discriminations by means of a pooling system which should do away with that severe competition at large points of shipment whereby these places obtained the benefit of lower rates. The legislators agreed with the railroads in recognizing that discrimination was the main evil to be stopped, but they distrusted the railroad remedy, because they believed that pools would be used to level rates up instead of leveling them down. The Interstate Commerce Law, finally adopted in 1887, was framed under the influence of these views. It was a far more moderate measure than any of the "Granger" laws; but its provisions, and especially the prohibition of pools, contained in this law, and in the Anti-Trust Law which was passed immediately afterward, had to some degree the effect of limiting railroad profits and thereby for many years lessening the construction of new lines.

England witnessed during the same closing years of the century, legislation similar in intent to the Interstate Commerce Law, though less definite in its results. The majority of countries, however, have not been content with limiting by legislation the arbitrary action on the part of railroad managers, but have insisted that a power of this kind could properly be placed only in the hands of agents of the government. In other words, they have committed themselves in a greater or lesser degree to the principle of State railroad ownership. This was in one sense no new thing. Belgium had from the first had State railroads, because the King of the Belgians, at the time of the first development of the railroad, was anxious that his country should enjoy the benefit of the new method of transportation, before private enterprise was ready to take it up. Ever since 1850 Prussia had had a very considerable State railroad system, originally undertaken for strategic purposes. But it was not till after the war of 1870, in connection with the increased national feeling which arose, that railroads were taken by governments as a means of strengthening governmental power over the

life of the nation. In the decade which succeeded the war of 1870, all the more important Continental countries, with the exception of France, greatly increased the hold which they had upon their railroads. The system of State ownership was already triumphant throughout Australia and powerful in British India. But in the light of actual experience it is seen that the results of government ownership in the matter of railroad economy and operation are not greatly different from those of private ownership. There are nearly the same possibilities of good management, and the same evil possibilities of bad management, whichever system is chosen. If we have a little more chance of irregularity under private management, this is balanced by an increased chance of inefficiency under government management. Much is made of comparative statistics by the advocates of one system or the other, but it is generally found on critical examination that these statistics prove far less than seems plausible on their face. The advocate of private ownership points to the fact that the freight rates per ton per mile in the United States are the lowest in the world; but his opponent can show that freight in the United States is handled in the largest masses and for the longest distances, and that in point of fact the freight rates of different countries vary in proportion to the average length of haul, whether the roads of those countries be owned by the government or by private corporations. The advocate of State ownership points to the low passenger rates in certain parts of Europe as compared with the much higher ones in England or the United States. But it can be shown, on the other side, that the high passenger rates are paid for having fast trains and for having trains numerous in proportion to the population which they serve. The high or low passenger rates of different countries depend, not upon private ownership nor upon State ownership, but on the average rate of wages per day received by the bulk of the population. If a man has high wages, he can pay money to save time; if he earns relatively low wages, he can sacrifice time to save money. In the former case the railroads will pay their train expenses by carrying relatively small loads at high speed; in the latter, by having few trains which carry large numbers of passengers very slowly.

Instead of arguing on the relative merits of State ownership or private ownership, the students of railroad economy at the present date recognize that the decision of this question depends on the industrial habits and traditions of different peoples. That system is the better which gives the best chance of securing efficient managers for the railroads, and of holding those managers responsible for using their power

in the public interest. When the civil service is good and private business methods slack, there is reason for State ownership. When the civil service is less good and private business methods better, the best results may be expected from ownership and management by private companies.

ARTHUR T. HADLEY.

Railroad Equipment, Organization, and Operation. The revolution wrought by steam as a means of transportation can best be measured by contrast with the method it superseded. It was an advance when the mail coach came into use in England. Previously the mails had been carried in carts or by post boys; while journeys were accomplished in private conveyances, on horseback, or on foot. The mail coach soon became popular, and there speedily grew up in Europe and this country a regular system of transportation by stage coaches and heavier vehicles; and, in improving character, as highways became safer, those agencies flourished till the advent of the steam engine in 1830. As for the speed and charges that were incident to transportation by mail coach and wagon, 8, 10, and 12 miles an hour were the maximum speed, and between London and Edinburgh outside passengers were charged £10, inside £14, and the trip occupied 40 hours. The same journey is now made in eight hours at a cost of about \$7.50. Manifestly only the wealthy could afford to travel in coaches. Others had recourse to wagons. Merchandise was carried in slow-going vehicles, and some idea of the cost may be derived from the tariff—namely, \$10 per ton for the 30 miles between Manchester and Liverpool. Compare that with the present situation at Pittsburg, whose manufacturers complain when required to pay \$3.60 per ton for the transportation of finished products to Chicago—a distance of 468 miles. Interesting to the student will always be reproductions of the earliest passenger trains. The occupants were exposed to the elements—their sole protection being an awning suspended overhead. Only a few passengers were provided with seats. The vehicles resembled a platform car, with sides three or four feet in height. Wooden roofs were afterward adopted, whereon the baggage of passengers was piled, and on these were also seated the guards. Each carriage was given a name, as stage coaches had been, and as sleeping, parlor, and private cars are now. The pictures further represent the gentry riding in their family carriages, which were lifted on trucks without removing the wheels. Originally the railroad was regarded as an improved highway, whereon the public, on payment of toll, could run their own conveyances.

Still more marvelous is the transformation that has been effected in the locomotive.

tive. We look with wonderment on the modern machine—than which there is no greater triumph of mechanical skill—but the day of small things, when the “Rocket” and its compeers awed and amazed their beholders ought not to be forgotten. Majestic as the upward march has been, the highest recognition will be given to the master mind that indicated the way. More, however, in utility than in form, has the standard locomotive progressed. Speaking of the first engine built by the Baldwin works, the Philadelphia “Chronicle” exultantly said: “This engine will draw 30 tons on a level road.” But proud as its owners were of its strength, they were loth to expose it to trial, as witness the following advertisement taken from a Philadelphia paper of that day:

“Notice.—The locomotive engine (built by Mr. W. Baldwin of this city) will depart daily when the weather is fair with a train of passengers; on rainy days horses will be attached.”

Over the intervening period we may pass to the year 1885, when the Baldwin works began to construct “decapods,” that is, engines with 10 wheels coupled, which were guaranteed to haul 3,600 tons of freight on a level track. Five years later the same company built locomotives that could haul 4,000 tons on an ordinary track, which exceeds the burden of an average ocean liner. Meanwhile mechanics have steadily sought to increase the carrying capacity yet not augment the dead weight per train. With that view, bridges were strengthened, heavier rails laid, and larger cars built, till the latter rose to 30,000 pounds each, then to 40,000, 50,000, 60,000, 80,000, and 100,000 pounds, which last weight is the capacity of pressed steel hopper cars of the year 1900. Necessarily, to move a train of 25 or 30 such loaded cars, locomotives of a strength truly Titanic are required; and these are being as readily constructed as were the light machines of 30 years ago.

Opportunity and experience have been the school of railroad men. Not often have the leaders possessed more than an elementary education. The most successful have been those who rose from the lowest positions. Quite early, associations were formed that met in annual conventions, such as the master mechanics, master car builders, roadmasters, trainmasters, conductors, general ticket agents, car accountants, general baggage agents, etc. The object was to compare methods, exchange experiences, test new propositions, promote uniformity, and establish standards. In effect these organizations were summer schools, and by the appointment of committees to investigate and report at subsequent meetings progress was steadily made and the railroad service was improved. Instead of each company being a law unto itself, rules adopted in convention became

the standard. Technical journals were approved by the associations, so that the progress of education was constant, and a higher degree of knowledge and skill was acquired by American employees than characterizes the railroad profession in other countries. The executive officers likewise met regularly; in fact every important department availed itself of such opportunity to gain information. To this blending of theory, experiment, and practice, and a general willingness to receive and impart instruction the unique excellence which has been attained must largely be attributed.

There was no luxury and little comfort in railroad travel when George M. Pullman began his experiments. To him the public is indebted for the palace sleeping car whereby a trip across the continent can be performed without discomfort; for the parlor coach, in which a day's journey is accomplished with ease; and for the dining car, wherein meals are served in quality and style not inferior to those of the best hotels. Ordinary coaches have also been so improved, lighted, and furnished that the longest ride in them is luxurious compared with that of a generation ago. So marked were the advantages afforded by special cars that the public speedily recognized them, thus compelling their adoption in one form or another by all through lines. Notwithstanding those added facilities it is possible now to travel from New York to San Francisco, in through cars sumptuously appointed, for a less sum than was formerly charged for a passage ticket from ocean to ocean.

Railroads were chartered as common carriers, not as forwarders; hence, as conceived and for many years conducted, the duties of the companies ceased when the end of their rails was reached. Thus there grew up in the early days a class of forwarders at terminal points who undertook to transfer goods from one railroad to another, and arrange for the forwarding of the same to destination. Shippers had to bear the expense of such intermediate service through their own agencies or by contracting with others for its performance. The adoption of through bills of lading—a voluntary act on the part of carriers—saved to shippers an infinite amount of trouble and no little expense. This result was not attainable till after certain loose links had been united. For example, half a dozen different companies, separately owned and operated, constituted the present New York Central route from New York to Buffalo. Many greater consolidations have since taken place, hence we are apt to underrate the initial undertaking; but its importance, because of the possibilities it revealed, entitles it to the first place in that line of performances.

The policy thus initiated was speedily followed in this country and Great Britain. The influence at which men marveled when it was projected from New York to Buffalo, was extended via the Lake Shore and Michigan Southern railway to Chicago, the Northwestern to Omaha, and via the Union Pacific three-fourths of the way across the continent; for, while Commodore Vanderbilt was president of the New York Central and Hudson River railroad, his son-in-law, Horace F. Clark, became president of the Lake Shore and Michigan Southern and the Union Pacific Railway Companies.

The tendency to combine, which spread with amazing rapidity, alarmed the public in English-speaking countries; and legislative committees were appointed to devise remedies for the alleged evil. Voluminous reports were issued and various preventives suggested, the noticeable one being the adoption by certain States of constitutional amendments forbidding the consolidation of parallel or competing lines. As there could be no effective way of estopping persons from controlling all they were able to buy, the process went on—the difference being that instead of operating the properties under one name and management, their separate identity was maintained; but the directory in each instance was practically alike. Eventually the interests of a few have to yield to the good of the many and as by the union of independent lines into through routes the service to the public was improved and cheapened, the new order gained favor, especially as without it commerce could not, in its present extent and rivalry, be successfully conducted.

Next in importance to the through bill of lading and unbroken transportation from initial point to destination are the approaches that have been made to unify the freight classifications. In the beginning each carrier established its own rules. Of course it was early seen that expensive goods, such as silks, cloths, and like valuable articles, would readily carry higher rates than would coal, iron, grain, or coarse commodities; consequently the former were placed in the first class; and according to the lesser risk involved or the better loading, the commoner goods were given lower ratings. Usually rates were adjusted on a mileage basis, the rate declining with the distance; but as parallel and cross routes were built and competition became keen the tariffs had to be revised to meet changing conditions. Competitive points were favored and this led to a mania for railroad construction. Aid was voted by municipalities, land grants and subsidies were offered by States and the nation, the result being that without much regard to other than local demands the present network of railroads sprang into existence. As already stated, at the initial stage each company made its

own classification and tariff. For a time those were quite simple, frequently being expressed on a single sheet. The progress made in this respect has been accomplished within the last quarter of the century.

It would now look ridiculous were a dealer to be charged fourth-class rates for a shipment from A to B, and then be required to pay third-class for the return of the goods over the same route from B to A; yet such inconsistencies were regular occurrences. Not till the adoption of the Interstate Commerce Law (in 1887) was the classification in use by the trunk lines and their connections made to apply in either direction. Previous thereto there were separate W. bound and E. bound classifications. The railroads operating in the territory W. of Chicago and St. Louis had, several years before, made that important advance.

The Trunk Line Association was then directed by Col. Albert Fink, and the organization of Western railroads by the writer. The W. bound tonnage was by the lines from the seaboard divided into four classes, while that of the Western roads was distributed among five numbered and at least three lettered classes. All after the first four were exclusively carload classes. To facilitate the division of W. bound tonnage between the trunk lines, Colonel Fink desired to reduce the number of classes to three. At that juncture a conference was arranged at Niagara Falls between the trunk lines and Western roads; but their differences could not be reconciled. The trunk lines wished to abrogate all carload rates, whereas the Western people, being close to the manufacturers, wanted to swell the number of carload classes. The Eastern parties withdrew, but the others remained and evolved what became known as the Western classification. It was substituted for numerous classifications, and within a short time governed in the territory W. of Chicago and St. Louis to the Pacific coast.

While it required much persistence to achieve this result, the satisfaction with which it was ultimately regarded prompted the writer (after the Interstate Commerce Law had become effective and Eastern railroads had adopted one classification the "Official") to apply in both directions E. of the Mississippi and N. of the Ohio, to try to unify the leading classifications then in use. In addition to the Official and the Western there was the Southern in the territory S. of the Ohio and E. of the Mississippi rivers. Accordingly another conference was called at Niagara Falls. The result was the appointment of a committee consisting of delegates from important sections of the United States; but the same fate attended this effort as the previous one between Eastern and Western railroads—an inability to agree on the number of classes.

Meanwhile the Interstate Commerce Commission viewed with anxiety this failure of the railroads to agree; and the passage by the House of Representatives of a joint resolution calling on the commission to formulate a uniform freight classification, provided the railroads did not undertake the work within a specified time, justified the chairman (Judge Cooley) in urging the writer to renew his efforts lest the commission be required to perform the task. The outcome was the creation of a second committee containing no representatives from the Pacific coast, but including one from Canada, thus imparting an international character to the deliberations. This body met, and its work, taken up at intervals of three months amid the press of other duties, continued over two years, when a unanimous report was made to the constituent organizations. To the latter the uniform classification was acceptable with the exception of two trunk lines. By those its adoption was defeated, and the earnest labors of the committee, the devout wishes of countless shippers, and of the majority of American railroads were thwarted. Annually since then the Interstate Commerce Commission urges Congress to compel the adoption of uniformity in freight classification; but though its practicability was demonstrated, and it is more earnestly desired by the commercial community than is any other reform, its outlook is not so promising as it was 10 years ago. No one in active service has the influence apparently to command the renewed coöperation of the railroads; and as the members of the Interstate Commerce Commission are not traffic experts the prospect of their performing the task is not inspiring.

Another reform which preceded the efforts to unify the freight classification should be noted—namely, the extension to all classes of rates per 100 pounds, and the inspection of packages to prevent misdescriptions. During the writer's early career as commissioner for the Western railroads all freight classified below fifth class was carried at stated carload rates. No attempt was made to ascertain the actual weight put in the cars. It was true that freight tariffs usually contained an instruction to agents to require the removal of all in excess of 24,000 pounds per car; but the rule was rarely enforced for the reason that track scales were comparatively unknown. The abuses that were practised led to frequent complaints by the more scrupulous, and as a remedial experiment certain Western railroads resolved to charge for the transportation of lumber by the 100 pounds. This worked so well that the rule was extended to classes A, B, and C freight; and as much of this originated with Eastern connections, the writer induced them to amend their tariffs. A conference of rail-

roads in the Middle States was convened in Cleveland at which carload rates were eliminated from their tariffs and rates per 100 pounds were substituted, and have since prevailed throughout the United States. Track scales were put in at convenient points, freight cars were weighed, loaded and light, or, when not practicable to do the former, the stenciled tare weight of the car was deducted from the gross. Weighers were appointed by the commissioner and paid through his office to avoid collusion and satisfy competitors that equality of treatment would be insured. This reform saved millions of dollars yearly to the railroads of the United States; in fact, it is not apparent how they could operate under a different condition. To return to former methods would bankrupt many railroads, would throw the business of the country into confusion, and inflict irreparable loss on interests that are prosperous.

None of the changes described could have been accomplished without organization. No railroad can afford to lead in a reform; therefore it is not wise to pass judgment hastily on organizations through means of which much has been accomplished. Suffice it to say that if there were now a strong association of railroads—such as the Railway Clearing House of England, which is incorporated by Parliament—shippers would soon have what they most ardently crave—uniformity in freight classification, or at least the removal of disparities that reflect on the intelligence of traffic managers who can neither explain nor justify their continuance. The United States Supreme Court decided in the *Trans-Missouri* case (March, 1897) that associations of railroads formed to maintain rates were in contravention of the Anti-Trust Law. So long as a right they had considered inalienable is denied them, the companies seem unwilling to join in the establishment of better relations. Thus the century closed with the deadlock between Congress and the carriers unbroken.

Strangely enough, the United States, which is ahead of other countries in the character of and service rendered by its railroads, is behind them in its political attitude toward corporations. In that respect Mexico has distanced us. Complete accord prevails there between the government and the railroads. The authority of the former is unquestioned, and its right to fix maximum rates of fare and freight is recognized. So likewise there is no doubt as to the power of Parliament to regulate the railroads of Great Britain. But in this country at every stage bitter opposition or veiled resistance has been encountered. Mexico completed her reconciliation with the railroads only in 1899; but every such effort in the United States, including that of a recent Congress, has failed. The

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precise situation may be described as follows: American railroads present the finest service, the lowest rates of fare and freight, the best equipment, the latest safety appliances, and the highest order of intelligence and ability among officers and men, together with the worst discriminations, grossest violations of law, and the most shameless disregard of official honor to be found anywhere.

In its operation the modern railroad compares favorably with the best disciplined army. Obedience and attention are most rigidly enforced. No general is more autocratic than is the typical president, and the latter is as strictly held to account. The president has subordinates whose duties are identical with those of a general's staff. The same precision that characterizes the German army is reproduced in every well-administered railroad. Those conditions have grown up gradually till routine operations move with smoothness of machinery. Admiration for the organization increases with acquaintance, and we cease to wonder at the pride which railway men take in their profession, and the warmth with which they usually speak of "our road."

The principal problem that has confronted railroad managers is to insure the maintenance of remunerative rates on the traffic carried. When the fixed charges are not met receiverships follow. Every expedient, therefore, that would lessen the cost of operating was adopted; but the limit in that direction was thought to have been reached; and, as no device for the strict maintenance of rates has yet succeeded, the inevitable result would have overtaken all—as it did many—a few years ago, had it not been for the ability to double and quadruple the capacity of freight cars. It has already been explained how this was brought about. Managers feared the journals would not carry loads heavier than 24,000 pounds per car, hence penalties were threatened in case of excess loading. Bridges and trestles, it was further assumed, would not bear the heavy strain. But on weighing some of the cars that slipped through, they were found to contain 5,000 and 10,000 pounds in excess of the prescribed weight, thus dispelling the illusion that the bearings, etc., were insufficient. Notwithstanding those discoveries meetings were held to restrict the dimensions of freight cars; but the efforts failed, and the demand for larger equipment continued till the average load per car is 100 per cent. greater than the maximum allowed 20 years ago. While the rate per ton per mile has steadily decreased till it is lower in the United States than prevails elsewhere, the average amount of paying freight per train mile has correspondingly increased, so that, with returning prosperity and an abundance of tonnage, most rail-

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roads have been able to make satisfactory showings.

Similar results were attempted prior to the passage of the Interstate Commerce Law by the formation of "pools." Those devices were of English origin, where they were known as "joint-purse" arrangements. In that country they had a semi-legal status, the solicitor-general having informed a parliamentary committee that the only party to complain was a stockholder who might enjoin the payment to another company of money in which he was interested. In Mexico pools are authorized by the railroad law of 1899; but attempts to legalize them in the United States, subject to the jurisdiction of the Interstate Commerce Commission, have invariably failed.

It has not, however, seemed that their revival is imperative. There is a community of interest on the part of owners, therefore they can delegate authority to leading bankers; and if the latter are enabled to shape the policy of the larger companies a recurrence of "rate wars" can be avoided. Such a course has been pursued in the East, as witness the entrance into the directories of the Baltimore and Ohio, Chesapeake and Ohio, and Norfolk and Western railways of representatives of the Pennsylvania railroad, the extension of the Vanderbilt influence to other properties, and the dominance of leading bankers in various directions. A request from the latter will have more force than would the strongest pool in restraining the zeal of ambitious agents to overreach their rivals. Hence the problem of maintaining remunerative rates is in process of solution by means which no legislation would seem able to circumvent. Where consolidations are forbidden by law, leases of the property and the operation of the latter under separate names are usually possible; and as control of the company is the result aimed at, the manner of its accomplishment is not material.

J. W. MIDGELEY.

Railroad Systems. The process of absorption of smaller concerns by large corporations is fully as marked among the railroads as it is among the great manufacturing industries. The growth in mileage of the largest roads is truly phenomenal, and it will surprise our readers to learn that on this continent there are three separate systems, each of which has a total mileage which is almost half as great as the total mileage of Great Britain. The largest aggregation controlled by any one company is that of the New York Central railroad, which totals 10,410 miles; making a very close second is the Pennsylvania system with 10,392 miles, while the great Canadian Pacific Overland route and connections total 10,018 miles. Another trans-continental line of almost equal size is the Southern Pacific, which owns and controls

9,441 miles. There are four companies controlling from 7,000 to 9,000 miles; seven companies controlling from 5,000 to 7,000 miles; three companies from 3,000 to 5,000 miles; and nine companies controlling from 2,000 to 3,000 miles of track, the total mileage controlled by 28 companies being nearly 150,000 miles. Of the five great trans-continental companies the Canadian Pacific and the Southern Pacific, with over 10,000 and 9,000 miles respectively, are by far the largest. The Atchison, Topeka, and Santa Fé comes next with 7,880 miles, followed by the Union Pacific with 5,584, the Northern Pacific with 5,449, and the Great Northern with 5,201 miles of track.

Railroad Tendencies. James J. Hill, builder and president of the Great Northern railway, speaks with authority on all questions dealing with the construction and management of railroads. The growth in 21 years of the system of which he is the head of from 380 to 5,500 miles, gives proof if that were needed, of his executive ability and of his good judgment. Speaking of the railway situation and our growing trade with the far East, Mr. Hill says:

"The forces likely to determine in future the construction of new lines of railway in the United States are the need for better terminal facilities, and the special requirements of particular sections. That the building of great trunk lines has come to an end is shown, I think, by the fact that during the past dozen years there has been a steady decline in railway construction in all parts of the United States. A railway that will not yield a prospective profit to its projectors has no legitimate reason for existence, and as the existing lines between the West and the East are prepared to transport twice or thrice the tonnage now offering, or likely to offer for many years to come, to attempt to parallel them with new ones would be a financial blunder little better than a crime. The competition of older rivals and the consequent division of business would render the stocks and bonds of the newcomers practically worthless, and investors have learned caution from the disasters of the past. Lines now in operation are pretty sure to seek and secure improved outlets, and there is bound to be a small but steady increase in mileage having for its object the development of some particular interest or section; but more than that should not be looked for in the near future. Indeed, in most of the States of the East and Middle West the existing mileage supplies all the facilities wanted. In such States no considerable amount of new mileage can be built with the assurance of profit, and this fact will exert a salutary influence in checking doubtful ventures and compelling obedience to the very excellent rule that where a line is capable of handling the transportation

of its section, the construction of a second should not be undertaken. Capital seeking investment will be mainly directed in future to the development of urban and interurban electric railroads, a department of transportation which is still in its infancy.

"The familiar law of the survival of the fittest applies with special force to railway management. Concentration is the dominant spirit of the age, for men have come to see that, all things being equal, the conduct of the largest mass is the cheapest and renders the surest profit to labor and capital. To this influence has been principally due the tendency to consolidation of lines—the absorption by lease or purchase of the weak by the strong—which has been at work during the last two decades. The fruits of this policy of consolidation, which is sure to be continued, are manifest even to the layman. It has produced the heavy steel rail, the 80-ton locomotive, and the continuous haul, and, in an economic sense, has brought the wheat fields of the Northwest approximately as near London and Paris as the farms of Yorkshire and Burgundy. Impelled by competition and consolidation, our railways are better equipped and more ably and economically managed—this with the least burden on their patrons—than those of any other country in the world. And here let me say that the mooted control of the railways by the government would prove a delusion and a snare. It would double freight and passenger rates, with an opposing loss in the skill, energy, and safety of management. Admirable as it is, our postal system is very far from what it would be had its perfection and development been left to individual impulse and enterprise. American railways have been private enterprises from the first, and it is the part of wisdom to make no change in present conditions. Existing laws give the citizen full and adequate protection against unjust discrimination or demands on the part of railway owners; and he would gain nothing and lose much by a resort to socialistic methods and measures."

No man has done more than Mr. Hill to foster our growing trade with the far East. His views on this subject are therefore of the first importance. He says:

"Some years ago I sent an agent to China and Japan to see what steps could be taken to extend the general use of wheat flour in those countries, as against their own rice, and found that it was simply a matter of price, which is largely influenced by transportation. When we have found new mouths which have never before used wheaten bread, to take the entire California, Oregon, and Washington wheat crops out of the European markets, it must largely reduce the amount going to Europe from America, and will soon affect the yearly shipments from the Argentine to European

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markets. The Great Northern is now building ships for this trade, which, when put in operation, will carry from 20,000 to 25,000 tons of freight each. However, it is one thing to build a ship and another to keep her in operation. If we are to have on the Pacific a merchant marine adequate to our needs we must be able to operate our ships under as favorable conditions as other nations. The Sailors' Union fixes the wages of sailors at \$30 a month, and of engineers and other ship employes at about twice the wages paid by European steamers, making it impossible to compete on equal terms with the English, German, and other foreign ships already on the Pacific. If our wages are to remain as high as at present, legislation by Congress is needed that will enable American-built ships to be operated at a profit. Such legislation, it seems to me, should take the form, not of direct subsidies, but of a reasonable bounty on exports of certain of our mineral and agricultural products."

Railroad, Underground, The. See UNDERGROUND RAILROAD.

Rail Wagon, a combination vehicle so constructed as to be readily convertible for use on any ordinary roadway or on a railroad track. It can be shifted from the one to the other at will, without the necessity of reloading or rehandling the contents between points of shipment and destination. By its use it is possible to utilize the electric roads for purposes of general freight traffic. It was invented by Joseph C. Brown, of Toledo, O., in 1898.

Raimondi, Marcantonio, an Italian engraver; born in Bologna, Italy, late in the 15th century. A goldsmith by trade, he early turned to engraving, and received his first great stimulus from woodcuts of Albrecht Dürer, which he saw at Venice about 1505. He copied on copper two sets of plates from the German master's designs for the "Life of the Virgin" and the "Passion of Christ." At Rome, where he worked from 1510, he was chiefly engaged in engraving Raphael's works, as "Lucretia," the "Massacre of the Innocents," the "Three Doctors of the Church," "Adam and Eve," "Dido," "Poetry," the "Judgment of Paris," etc., and subsequently those of Raphael's pupil, Giulio Romano. On account of the power of his drawing and the purity of his expression, he is accounted the best among the engravers of the great painter. The capture of Rome by the Constable Bourbon in 1527 drove Marcantonio back to Bologna, where he probably remained till he died, some time before 1534.

Rain, in meteorology, the fall of water in drops from the clouds, or the drops which fall. A cloud consists of aqueous vapor, the individual vesicles of which are very small. When by the constant condensation of fresh aqueous vapor these vesicles become large

Rainbird

and heavy, and several of them unite, they are unable to resist the action of gravity and fall as rain. In geology, the direct action of rain, as distinguished from its indirect one in creating streams, rivers, etc., is a potent aqueous cause. In many places, however, its effect is much diminished by the protective influence over the soil exerted by the vegetation. Penetrating into crevices of rocks, it is frozen and splits them. Moreover, in passing through the atmosphere, it absorbs a considerable amount of carbon dioxide, which enables it to transform the carbonate of lime in limestone rocks into the soluble bicarbonate, and ultimately waste them away; it acts also on felspar, etc. See RAIN MAKING.

Rainband, a name given by the English astronomer, Prof. Piazz Smith, to the dark band seen in the spectrum of solar light after passing through the vapor of water. The absorption spectrum of water has been carefully mapped. By recording the varying amount of moisture in the air the rainband serves as an indicator of approaching rain. In making hygrometric observations, the spectroscope has an advantage over the hygrometer, in that the former records the condition of a great depth of atmosphere, while the latter indicates merely the condition existing for a short distance around the instrument. The place of observation and the temperature must be taken into consideration in making predictions from the rainband. The approach of steady and long continued rain is sometimes indicated by the gradual increase in the intensity of the rainband, for several days while sudden and heavy showers are likely to be indicated more promptly. To observe the rainband accurately, a spectroscope of great dispersive power and good definition must be used. A micrometer to separate the band into lines was invented by Professor Cook. It is important to note whether the darkness of the line lessens gradually or rapidly with increase of attitude. When light from the zeniths or the horizon produces a dark band heavy rain may be looked for.

Rainbird, a name given somewhat indiscriminately to two cuckoos in Jamaica: (1) *Saurothera (Cuculus, Linn.) vetula*, a large handsome bird, soft brown-gray on the back, dullish yellow on the under surface, and rusty-red on the wings, with the long tail showily barred with black and white. It feeds on animal substances. Gosse says, "I have found in various individuals, locusts, Phasmata, spiders, Phryni, a whole mouse, caterpillars, etc." It is sometimes also called tom fool, from its silly habit of gratifying its curiosity instead of securing its safety. (2) *Cuculus pluvialis*; head dark gray, merging on the neck into dark grayish-green, the hue of the back, rump, and wings, with metallic gloss. Tail feathers

Rainbow

black, barred with white; throat and breast white; remaining under parts deep red-brown.

Rainbow. The rainbow is the best known of all optical meteorological phenomena, consisting of a colored arch formed opposite the sun on falling raindrops, and visible whenever the necessary conditions of a passing shower on one side and a clear and not too high sun on the other occur. Two bows are frequently seen, each exhibiting the full spectrum of colors from red to violet; but in the inner or primary bow the red is the outer edge and violet the inner, while in the outer or secondary bow the order is reversed; the red being inside and the violet on the exterior. The colors are always arranged in a definite order, that of the solar spectrum—viz., red, orange, yellow, green, blue, indigo, and violet, but shade imperceptibly into each other. The cause of this breaking up of the sunlight into its constituent colors is explained in most physical and meteorological textbooks, but may be briefly summarized as follows:

For the primary bow (fig. 1), let PQR represent the section of a raindrop, and SP a ray of light falling on it. The ray enters the drop at P, meets the surface again at R, is reflected to Q, where it leaves the drop in the direction of QE. The ray is refracted or bent on entering the drop at P and again on emerging at Q—the amount of this refraction depending on the acuteness of the angle at which the ray meets the surface. Now it may be shown that there is

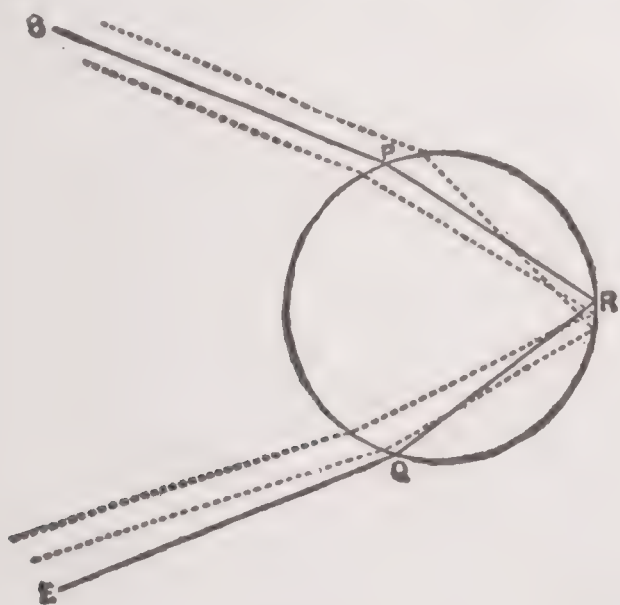


FIG. 1.

a particular point P, such that any ray from S striking the surface below P emerges again above Q, and any ray above P also emerges above Q—the former owing to the more acute angle of the reflection, and the latter to the greater refraction on entering and leaving the drop. The course of two such rays is shown by the dotted lines in fig. 1. Q is thus a turning-point in the emerging rays, and near it a very large number of rays pass out, and an observer

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at E sees a bright image of S in the direction EQ. This statement applies to any one color of sunlight; but, as the refrangibility increases from red to violet, the latter is bent more at P and Q, and the line EQ lies at a flatter angle. The observer, therefore, sees the violet rays reflected on drops at a less altitude than those that reflect the

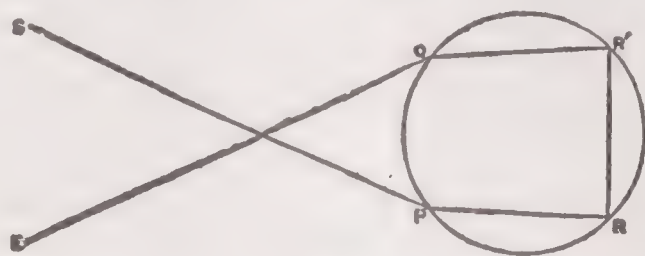


FIG. 2.

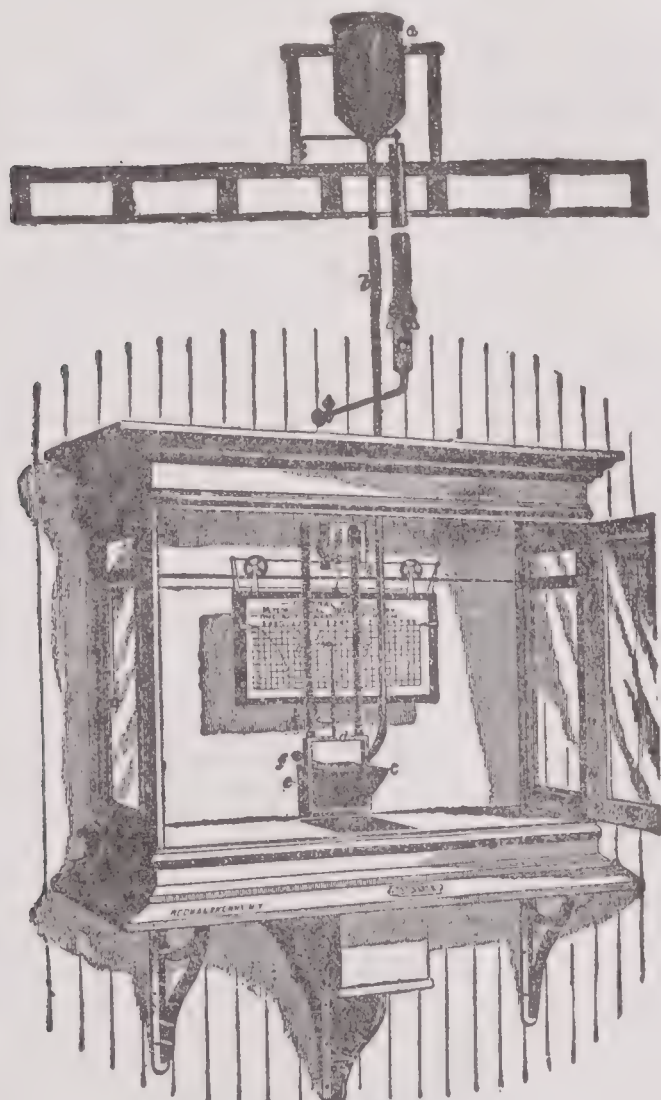
red, the other colors being intermediate. The raindrop being spherical, this reflection takes place in all directions, the fixed condition being the radius of the bow, that is the angle between the line from the observer to the bow and that passing from the sun to the observer, or, in other words, the observer's shadow. For red light this angle is $42^{\circ} 39'$, and for violet $40^{\circ} 13'$. If the sun were a luminous point each color would be sharply defined, but as the disk of the sun subtends an angle of about $30'$ each color is broadened to this amount, and they overlap.

Exactly similar reasoning explains the secondary bow (fig. 2). The light that forms it has been twice reflected, at R and at R', the point Q lies above P, and rays entering either above or below P all emerge below Q. A glance at the diagram will show that the greater bending of the more refrangible rays makes the line EQ more nearly vertical, and therefore the violet rays form the outer edge and the red the inner of the secondary bow. The radius of the red is $50^{\circ} 5'$, and of the violet $54^{\circ} 0'$. The space between the bows gets no reflected light, but that inside the primary and outside the secondary is faintly illuminated by rays such as are indicated by the dotted lines in fig. 1 and their equivalents in fig. 2, which are not shown. These rays "interfere" with each other, and cause alternations of color which appear as spurious bows inside the primary and outside the secondary. They can only be seen with strong sunlight and small drops of rain.

The radius of the primary bow being roughly 40° , it is evident that it cannot be seen when the sun is at a greater elevation than this, as the highest part of the bow would lie below the horizon. Hence in the latitude of Edinburgh rainbows cannot be seen for several hours about noon at the time of the summer solstice. If the drops of water be very small the interference of the rays causes such a complete overlapping of the colors that the bow appears white: this is the case generally with a fog-bow.

Raines Liquor Law

Intersecting rainbows have frequently been seen. When the sun is reflected from a surface of still water a bow is formed by the reflected image as well as by the sun itself. Lunar rainbows often occur, but the feebleness of the moon's light usually prevents any colors being observed. There are many popular weather prognostications connected with rainbows, all dependent on the fact that they imply local passing showers. "A rainbow in the morning is the shepherd's warning; a rainbow at night is the shepherd's delight," is easily understood when we remember that the rainbow is formed opposite the sun, and that weather-changes generally pass from W. to E.



RAIN GAUGE.

Raines Liquor Law, an act passed in 1896 by the Legislature of New York. It abolishes excise boards; license to anyone not a criminal; raises cost of license from \$250 to \$800 in New York city; divides license fees between State and county in ratio of 1 to 2; permits local option in towns but not in cities; no renewal within 200 feet of school or church without consent of two-thirds of owners; revokes license on individual complaint, forfeited license not renewed within five years; interior of saloons exposed to view when closed on Sundays; no free lunches; restaurants not to serve drinks with meals on Sunday; apartment houses not to serve drinks in private

Rain Making

rooms week day or Sunday; imposes penalty of six months to one year and twice license fee for selling without a license.

Rain Gauge, an instrument or contrivance for measuring the amount of rain which falls on a given surface. They are made of various forms. One simple form consists of a copper funnel five to seven inches in diameter, inserted in the neck of a bottle placed on a stand and protected from the sun's rays, to prevent evaporation. The rain collected in the bottle is measured in a glass jar having one-tenth the area of the funnel, and graduated so that a rainfall of one-tenth of an inch collected by the funnel is measured by one inch on the side of the vessel. The stand should be placed at a sufficient distance from any buildings, etc., to prevent their affecting the amount falling into the funnel.

Rainier, Mount, a mountain of volcanic origin, the highest in the State of Washington, 14,363 feet high. It is a part of the coast range near Puget Sound, E. of Tacoma, and is sometimes called by the name of the city. The first ascent was made in 1870. Routes are now well marked on both E. and W. slopes. An Alpine club of the Pacific coast, the Mazamas, the party of 73 including members and guests, ascended it 1897. During this ascent, Prof. Edgar McClure was killed. There are several glaciers on this mountain, and it has a well-defined crater, which induces the belief that it is an extinct volcano.

Rain Making. Various attempts have been made in sections of many countries subject to long periods of drought to produce artificial rain, or more properly to force the fall of rain out of its due season. The great majority of experiments have been conducted on the theory of concussion from explosions. In 1891, the Congress of the United States made an appropriation for a series of experiments in Texas, with the view of ascertaining whether means could be provided for relieving the arid territory of the Western and Southwestern States. The experiments were conducted by General Dryenforth for the Department of Agriculture, and were watched with much interest by both scientists and agriculturists.

After the close of the experiments, General Dryenforth claimed that they had demonstrated:

"First—That the concussions from explosions exert a marked and practical effect upon the atmospheric conditions in producing or occasioning rainfall, probably by disturbing the upper currents.

"Secondly—That when the atmosphere is in a threatening condition—which is frequently the case in most arid regions without any rain resulting—rain can be caused to fall almost immediately by jarring together the particles of moisture which hang in suspension in the air. This result was repeatedly effected during our operations, the drops sometimes commencing to fall within 12 seconds from the moment of the initial explosion.

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"It also seems probable that the immense amount of frictional electricity generated by the concussions and the mingling of opposing currents of air may have considerable influence in the formation of storm centers by producing a polarized condition of the earth and air, and so creating a magnetic field which may assist in gathering and so condensing the moisture of the surrounding atmosphere."

Scientists generally pronounced the experiments a failure. Prof. H. A. Hazen, writing on the subject of artificial rain, and with the newspaper reports of the Dryenforth experiments before him, said:

"The principal argument advanced in favor of the idea that concussions in the atmosphere would produce rainfall was the supposed fact that rain almost invariably follows a heavy battle. An examination of the records shows, however, that only about 7 per cent. of the battles of the Rebellion were followed by rain, and it is not at all incredible that natural rain occurred in these few cases. The principal battle which was followed by rain was that of Bull Run, and in this case it is known that rain had been falling at Charleston and places farther S. before the battle had begun.

"Much has been made of the supposed fact that no rain falls in this region, selected for experiment, West Texas; on the contrary, this is just the rainy season there. Moreover, it is known that there have been phenomenal rains in the Western country this summer and such as have given almost unprecedented crops. It is not at all improbable that these rains have gradually worked S. to Texas. An examination of the rainfall from only a very few stations shows that natural rain fell in this region (W. Texas) on 16 out of 22 days, from Aug. 9 to 30. That these were natural rains, and not at all dependent on the explosions is shown by their extension over thousands of square miles. It is easy to see how difficult it would have been to make these explosions at a time when rain was not imminent.

"The first explosions were made Aug. 9, and the next day glowing accounts, announcing a successful issue of the trials, were telegraphed over the whole country. Again, after the second trials on Aug. 18, the telegrams indicated a wonderful success, but in both these cases it was announced that the explosions were merely preliminary, and that the decisive experiments would be made Aug. 20. We may suppose that on the 20th, if the previous results were any criterion, the concussions would give undoubted proof of their rain-making properties. Not a telegram appears to have been sent out on the 21st, and on the 22d came the very significant telegram that the trials of the 20th proved nothing. Such a statement from such a source would seem to settle this whole matter beyond a peradventure.

"It may be well to inquire just what may be expected from such explosions in the atmosphere, as shown by previous experiments. It has been found that a mist could be formed by making sudden shocks or miniature explosions in a receiver filled with dust-free saturated air, while the experiments of Mr. Aitken of Scotland have shown that under ordinary conditions it is impossible to form a cloud in dust-free air. It is very evident, however, that this result can give very little encouragement to the rain-makers, for it is absurd to suppose that such an effect could be produced, except at the exact moment of the explosion, and over an area of only a very few thousand square feet. The claims have been advanced that rain occurring four or more hours after the concussions might be laid to their door, but this cannot be accepted for a moment in the light of the natural rains that have occurred in this region."

W. K. Curtis, M. D., who was present when the experiments were made, in the dual capacity of expert and investigator, thus described the several operations:

Rain Making

The facts are, that neither the aeronaut nor anybody else made a balloon ascension while on the plains. The real experiment—that of making heavy explosions in the upper air—was never performed, as only five balloons were inflated and sent up during their entire stay, and of these only two exploded. The others floated away "unburst," one being found several miles S. of the land, and another was seen traveling toward Washington City. Only a few kites with small amounts of dynamite and rock, a rock powder, were sent up. Explosions were made on the ground both at regular and extremely irregular intervals, and this was mostly done by the cowboys.

The first rain that fell after their arrival was on the 13th, before they made any experiment, yet the Dryenforth dispatches reported it as "a heavy rain at the ranch in response to the party's efforts." They did not begin to prepare their material for making the gas till the 14th, and at that date the balloons were not even unpacked. The fact is, the winds had been in the S. E. for some time, which is a sure indication of rain, and there was a good deal of rain through this section at that time.

Dr. Curtis quotes dispatches sent to certain Eastern papers telling of the success of the experiments, and says, "This success was scored three days before they began to manufacture the gas and five days before the first balloon was exploded." Another rain, a light one, was no more due to the "party's efforts" than it was to the cannonading in Chile. The clouds were overhead and the rain was to fall when they made their grand explosion. This rain was hardly enough to wet one's clothes. When the clouds were down, all the rainmakers did was to fire about 20 shots on the ground, two pounds of giant powder being used at each shot.

The doctor discusses at some length the climate of Texas, showing that there is usually a rainy season from about the middle of August till the end of September, and that this season was taken advantage of by the Dryenforth party. They were taken by surprise when rain came before their paraphernalia were unpacked but they did not hesitate to claim credit for bringing the rain. Their kites would not fly, and they were sorely puzzled, for Professor Meyer made measurements and said that the kites were geometrically correct and must fly. After repeated efforts, and when they were about to abandon the kites, a cowboy, who had not forgotten his boyhood days, called attention to the fact that there were no tails on the kites.

The first balloon they tried to send up took fire, and everybody was frightened till a cowboy lassoed it and dragged it into a stock water pond. Two days later another

little balloon was sent up. This was on Sunday. It exploded at a distance of about one mile and a half. That night local rains fell in several places, but none at or near the ranch. It is due to Jupiter Pluvius to say that he had evidently been prepared to rain for several days. Clouds came up each evening from the N. W., as is usual at that time of year. On Thursday heavy, dark clouds appeared. The dynamite was put in position and several charges exploded; the clouds parted and the rain passed by and fell W. of the Pecos, nearly 100 miles from the ranch. Specials were sent out from General Dyrenforth's desk and published in the daily papers, stating that four or five explosions were made in one day in the presence of 50 witnesses, and that on each occasion copious showers fell in from 10 to 40 seconds. Dr. Curtis had the particulars from Professor Russell, as follows:

A dark cloud was passing over; the opportunity was seized to explode a charge of giant powder. A few drops of rain fell. Another small dark cloud passed over and dropped a slight sprinkle. Another charge was fired directly under it, and those present were of the opinion that the drops fell a little thicker after than before the explosion. This is the truth regarding that experiment.

Up to the 22d, when Dr. Curtis left, there had been so little apparent correspondence between promise and performance, so manifest an ignorance of the practical operation of the appliances, so plain a tendency of each member of the party to either not act at all or to act on his own hook altogether, so potent a lack of discipline and system in work, that interested parties who visited the ranch in large numbers went away filled with what is politely called fatigue. There was nothing done afterward except to make ground explosions, and the result was nothing.

Rain Prints, indentations produced in geological times by raindrops on sedimentary strata when the latter were soft.

Rainsford, William Stephen, an American clergyman; born in Dublin, Ireland, Oct. 30, 1850; was graduated at St. John's College, Cambridge, England, in 1872; was curate of St. Giles' Church, Norwich, England, in 1873-1876; made missionary tours in the United States and Canada; was assistant rector of St. James Cathedral, in Toronto, in 1878-1882; and rector of St. George's Church, New York city, in 1883-1905. His publications include "Sermons Preached in St. George's" and "The Church's Opportunity in the City of Today." Dr. Rainsford became widely known by his earnest advocacy of what has become popularly known as the "institutional church." He did much to supply wholesome recreation for the young of both sexes in

the vicinity of his church, who were without the means to secure it for themselves.

Rain Tree (*Pithecolobium saman*), a leguminous tree of tropical America, now largely planted in India for the shade it furnishes, and because it flourishes in barren salt-impregnated soils, as well as for its sweet pulpy pods, which are greedily eaten by cattle. Another species, *P. dulce*, has also been introduced into India, its pods also being edible.

Rainy Lake, a sheet of water forming a portion of the boundary line between Ontario and the United States, W., and 100 miles distant from the nearest point, of Lake Superior, and about 50 miles long. It discharges by Rainy river into Lake of the Woods.

Raipur, a town in the Central Provinces of India; on a plateau (950 feet), 180 miles E. of Nagpur; it has numerous tanks and groves of trees, a strong fort (1640), and a trade in grain, lac, cotton, etc. Pop. 24,948.

Raisiné, a rob, or syrup, made by boiling new wine, and skimming until only half the quantity of wine remains, after which it is strained. Apples, pared and cut into quarters, are added to it; and it is allowed to simmer gently till the apples are thoroughly mixed with the wine, when it has a very pleasant, sweetish, acid taste, Cider may be used instead of wine.

Raisin River, a stream rising in Hillsdale co., Mich., and falling into Lake Erie, 2½ miles below Monroe, after a circuitous course of about 130 miles.

Raisins, grapes dried in the sun. In the case of the best grapes the process is effected by cutting half through the fruit stalk without detaching it from the tree, or by gathering the grapes when fully ripe and dipping them in a lye made of the ashes of the burned tendrils, after which they are exposed to the sun, or they may be simply laid out to be desiccated. Inferior qualities are dried in an oven. Raisins are extensively produced in California. They are slightly refrigerant. In Europe and the United States they are used solely to sweeten preparations, in India they are given as a medicine. They are an ingredient of compound tincture of cardamoms and of tincture of senna.

Rájah, or more correctly RÁJÁ, originally, a title which belonged to princes of Hindu race who, either as independent sovereigns or as feudatories, governed a territory. Now, however, the title has a much wider extension; it is used of independent sovereigns, of subject or "protected" princes, of petty chiefs, of great landowners, and of some persons of eminence who are neither rulers nor landowners.

Rajamahendri

Rajamahendri (formerly often spelt Rajahmundry), a town of India, in the presidency of Madras; on the left bank of the Godavari, 30 miles from its mouth. It has a museum, a provincial school, two jails, and some Christian churches. From 1753 to 1758 it was held by the French.

Rajmahal, a decayed town of India; on a steep eminence on the right bank of the Ganges; 170 miles N. N. W. of Calcutta. It was long the chief town of the Bengal and Bahar provinces, but is now deserted and ruinous, being only noteworthy for the remains of its palaces, formerly belonging to Shah Shuja and Kasim Ali, and as a station in an important transit trade. Its commercial value has been lessened in consequence of the Ganges often shifting its bed at this point. In the beginning of the 19th century it had 25,000 inhabitants.

Rajon, Paul Adolphe, a French etcher; born in Dijon, France, in 1842. He was trained in Paris, partly at the School of Fine Arts. About 1865 he turned to etching, and gained immediate success with his first plate, "Rembrandt at Work," after Meissonier. Standing in the front rank of French etchers, he won several medals at the Salon exhibitions, and produced numerous beautiful etched portraits and plates for books. In 1872 he visited England, and published in London in 1873 a portrait of John Stuart Mill after Watts, as well as in subsequent years many other plates. His greatest achievements were "The Emperor Claudius," a picture by Alma Tadema, the portrait of Darwin by Oules, and those of Tennyson, Joachim, and Mrs. Anderson Rose by Watts. He died in Auvers-sur-Oise, June 8, 1888.

Rajputana, an administrative territory of India, embracing 21 native States and the British district (2,711 square miles; pop. 460,722) of Ajmere-Merwara. It lies between Sind on the W., the Punjab on the N., the Northwestern Provinces on the E., and several native States of Central India on the S. Its total area is 128,980 square miles, and its total pop. (1901) 9,841,765. The most important of the native States are Jaipur, Jodhpur (or Marwar), and Udaipur (or Mewar); next follow Ulwar (Alwar), Bhartpur, Kotah, and Bikaner. This region is crossed by the Aravalli Mountains, and consists in great part of sandy, barren plains, though there are of course numerous fertile valleys and other tracts. It gets its name from the ruling race of predominant Aryan tribes, called Rajputs. They are a proud aristocracy, own the soil, and have furnished ruling dynasties to very many of the native States of India. Yet in 1881 they numbered only 479,554. At the time of the Mohammedan invasions in the 11th century the Rajputs ruled over half a dozen

Raleigh

strong States—Kanauj, Ajmere, Anhilwara, Udaipur, and Jaipur. From the end of the 16th to the middle of the 18th century these States acknowledged the supremacy of the Mogul Emperor of Delhi. Then they were made to recognize the Mahrattas as their masters; since the Mahrattas were crushed by the British the Rajput States are independent allies.

Rake, an implement having a head provided with teeth and a long handle projecting from the head in a direction transverse to that of the teeth and nearly perpendicular to the head. Specific names indicate purpose or construction, as hay, stubble, barley, manure, horse, tilting, drag, etc. Hand rakes are of wood for hay or grain, and of metal for garden use. Horse rakes are of several kinds, some with, others without, wheels. In some the teeth are independent, so as to yield to obstacles without affecting the operation of other teeth. Also a small instrument, somewhat resembling a hoe, having a turned-down blade set at right angles to the handle, used by the croupier to collect the stakes on a gambling table.

Rakoczy March, a simple but grand military air by an unknown composer, dating from the end of the 17th century, said to have been the favorite march of Francis Rakoczy II. of Transylvania. The Hungarians adopted it as their national march, and in 1848 and 1849 it is alleged to have had the same inspiring effect on the revolutionary troops of Hungary as the "Marseillaise" had on the French. The air most generally known in Germany and elsewhere out of Hungary as the Rakoczy march is one by Berlioz in his "Damnation of Faust"; Liszt also wrote an orchestral version of the original.

Rakshasas, in Hindu mythology, a class of evil spirits or *genii*, cruel monsters, frequenting cemeteries, devouring human beings, and assuming any shape at pleasure. They are generally hideous, but some, especially the females, allure by their beauty.

Rale, in pathology, a noise or crepitation caused by the air passing through mucus in the bronchial tubes or lungs. There are various râles—the crepitant, the gurgling, the sibilant, the sonorous, etc. The râle or rattle which precedes death is caused by the air passing through the mucus, of which the lungs are unable to free themselves.

Raleigh, a city, capital of the State of North Carolina, and county-seat of Wake co.; on the Southern and Seaboard Air Line; 28 miles S. E. of Durham. Here are the State Capitol, United States Government Building, State Penitentiary, State Institution for the Deaf and Dumb and the Blind, State Asylum for the Insane, Home for In-

Raleigh

curables, Rex Hospital, State Agricultural and Mechanical College, Baptist Female College, Male Academy, Shaw University (Bapt.), Peace Institute (Pres.), St. Augustine's School (P. E.), St. Mary's School (P. E.), and, near the city, the University of North Carolina, and Wake Forest College (Bapt.). The city contains electric street railroads, gas and electric lights, water-works, National and savings banks, and daily and weekly newspapers. It has a large trade in cotton and tobacco, and its industries include flour mills, phosphate works, foundries and machine shops, brick making plants, car and car wheel shops, ice factory, wood working mills, etc. The assessed property valuation is nearly \$6,000,000. Pop. (1900) 13,643; (1910) 19,218.

Raleigh, The, a United States twin-screw, steel, protected cruiser; length 300 feet; breadth 42 feet; displacement is 3,213 tons; mean draft of 18 feet; and horse power 10,000. It carries a main battery of one 6-inch and 10 5-inch rapid fire guns, and a secondary battery of eight 6-pounder rapid-fire guns, four 1-pounder rapid-fire guns, and two Gatlings. Its speed is 19 knots; full crew 20 officers and 292 men; cost, \$1,100,000. The "Raleigh" has a historic record through its service at the battle of Manila Bay, May 1, 1898.

Raleigh, Sir Walter, an English soldier, statesman, courtier, colonist, and philosopher; born in Budleigh, Devonshire, En-



SIR WALTER RALEIGH.

gland, in 1552. After receiving the rudiments of his education at home, he was, about 1568, sent to Oxford. He did not long remain there; for, having an enterprising spirit, he entered into the troop of gentlemen volunteers who went to the assistance of the Protestants in France, where

he continued about five or six years. He subsequently joined the expedition of General Norris to the Netherlands, in aid of the cause of the Prince of Orange. Soon after his return he engaged with his brother-in-law, Sir Humphrey Gilbert, in a voyage to America, whence they returned in 1579. The next year he was in Ireland, where he distinguished himself against the rebels of Munster. On his return to England he introduced himself to the notice of Queen Elizabeth by a romantic piece of gallantry. Her majesty, while taking a walk, stopped at a muddy place, hesitating whether to proceed or not; on which Raleigh took off his new plush cloak, and spread it on the ground. The queen trod gently over the foot-cloth, and soon rewarded the sacrifice of a cloak with a handsome suit to the owner. His reputation for soldiership, his learning, which was varied and profound, his eloquence and ready wit, and the personal advantages and accomplishments, in which he was preëminent, all combined in raising him high in his sovereign's favor. Having obtained from Elizabeth an ample patent and the title of lord-proprietary over an extensive region, he sent forth two ships, under Captains Amadas and Barlow, which reached the shores of North Carolina in July, 1584, and proceeded N. to Virginia. The name last mentioned was given to the new country in honor of the "Virgin Queen," on the return of the successful explorers. Raleigh's patent was confirmed by Act of Parliament. He was elected, along with Sir William Courtenay, for his native shire, and received the honor of knighthood, with a more lucrative gift, that of a monopoly for the sale of wines, by which he acquired considerable wealth.

A joint-stock company was now formed by Sanderson, a merchant of London, Raleigh and Sir Adrian Gilbert, another of his half-brothers, to find the Northwest Passage. The voyages of Davis to the Arctic Seas were made under their auspices. But Raleigh and his partners sent a fleet to Virginia, under his relative, Sir Richard Grenville. A party of intending colonists, with Ralph Lane at their head, were landed at Roanoke. They got into difficulties, however, when Grenville left them to return home, and they might have been starved or murdered by the savages, had not Sir Francis Drake come in time to relieve them. Raleigh himself never visited his settlement in Virginia, but he sent thither, in 1587, a fresh party of settlers, governed by Mr. John White, with 12 assistants, who founded the city of Raleigh, now capital of North Carolina. The introduction of tobacco into England, if due to Raleigh, must be referred to the date of Ralph Lane's coming home.

In the defeat of the Spanish Armada, in 1588, Sir Walter bore a glorious part, for

which he received distinguishing marks of favor from the queen. In 1591 he sailed on an expedition against the Spanish fleet, but without success. About the same time he incurred the queen's displeasure by an intrigue with one of her maids of honor, whom he afterward married. In 1595 he sailed to Guiana, and destroyed the capital of Trinidad. The year following he took a distinguished part in the taking of Cadiz. Honors were lavished in abundance on him, and he obtained the lordship of St. German's, Cornwall. Raleigh was one of those who brought about the fall of Essex, and remained in the favor of the queen till her death; but, in the succeeding reign, his fortunes changed. He was stripped of his preferments, tried, and condemned for high treason, on a charge the most frivolous, and without the least evidence. He remained in the Tower of London 13 years, during which time he wrote several works on various subjects of great importance, the best of which was the "History of the World" (1614). The year following he was released, occasioned by the flattering account he had given of some rich mines in Guiana. On gaining his liberty, he sailed to that country in search of those pretended mines, instead of discovering which, he burned the Spanish town of St. Thomas, and returned to England, where, in consequence of the complaint of Gondemar, the Spanish ambassador, he was apprehended, and, in a most unprecedented manner, beheaded, on his former sentence. His works are historical, philosophical, poetical, and political. He died in London, England, Oct. 29, 1618.

Rallentando, in music, a direction that the time of the passage over which it is written is to be gradually decreased.

Ralph, James, an English poet; born in Philadelphia, Pa., about 1695. He went to England in 1725 with Benjamin Franklin, and was unsuccessful in his first efforts to win public favor. His poem on "Night" (1728) was ridiculed by Pope in his "Dunciad"; but his continuation of Guthrie's "History of England" (1744-1746) won public praise. He also published "The Other Side of the Question" (1742), a reply to a criticism on the Duchess of Marlborough. He died in Chiswick, England, Jan. 25, 1762.

Ralph, Julian, an American journalist; born in New York, May 27, 1853. He was connected with the New York "Sun" (1875-1895); the New York "Journal" (1896); the London "Daily Mail" (1899). His publications include: "On Canada's Frontier"; "Dixie"; "Our Great West"; "Chicago and the World's Fair"; "People We Pass"; "Alone in China, and Other Stories"; "An Angel in a Web"; "At Pre-

toria"; "War's Brighter Side"; etc. His contributions to magazines were numerous and very popular. He died Jan. 20, 1903.

Ralph Iron. See SCHREINER, OLIVE.

Ralston, William Ralston Shedden, an English-Russian scholar; born in 1828. His surname was originally Shedden. He studied at Cambridge University (1846-1850); was called to the bar at the Inner Temple in 1862, but never practised; and from 1853 to 1875 held a post in the library of the British Museum. He four times visited Russia; in 1886 was elected a corresponding member of the St. Petersburg Imperial Society of Sciences; and besides many review and magazine articles, and a translation of his friend Turguenieff's "Liza" (1869), published "Kriloff and his Fables" (1869), "Songs of the Russian People" (1872), "Russian Folk-tales" (1873), and "Early Russian History" (1874), the last his Ilchester lectures at Oxford. He died in London, England, Aug. 6, 1889.

Ram, in machinery, the weight of a pile or post driver (see MONKEY). In nautical language: (1) A beak of iron or steel at the bow of a war-vessel, designed to crush in the sides of an adversary by running against her "end on"; the ram can be detached from the vessel. (2) A steam iron-clad, armed at the bow below the water-line with such a beak. In old warfare, same as BATTERING RAM (*q. v.*). In shipbuilding, a spar, hooped at the end, and used for moving timbers on end by a jolting blow.

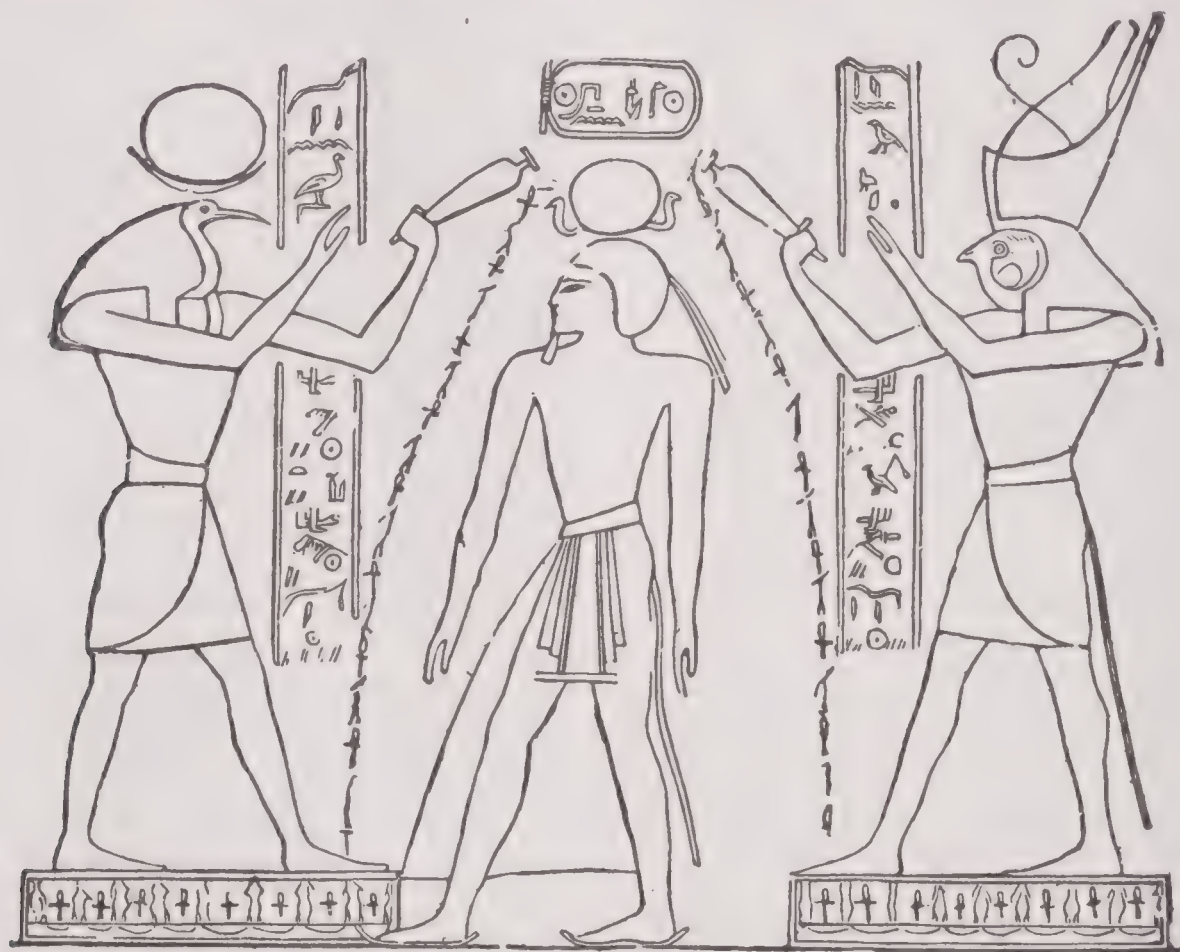
Rāma, in Hindu mythology, the name common to three incarnations of Vishnu, of Parasurāma, Rāmachandra, and Balarāma. See VISHNU.

Ramadan, the ninth month in the Mohammedan year. In it Mohammed received his first revelation, and every believer is therefore enjoined to keep a strict fast throughout its entire course, from the dawn — when a white thread can be distinguished from a black thread — to sunset. Eating, drinking, smoking, bathing, smelling perfumes, and other bodily enjoyments, even swallowing one's spittle, are strictly prohibited during that period. Even when obliged to take medicine the Moslem must make some kind of amends for it, such as spending a certain sum of money on the poor. During the night, however, the most necessary wants may be satisfied — a permission which, practically, is interpreted by a profuse indulgence in all sorts of enjoyments. The fast of Ramadan, now much less observed than in former times, is sometimes a very severe affliction on the orthodox, particularly when the month — the year being lunar — happens to fall in the long and hot days of midsummer. The sick, travelers, and soldiers in time of war

are temporarily released from this duty, but they have to fast an equal number of days at a subsequent period when this impediment is removed. Nurses, pregnant women, and those to whom it might prove really injurious are expressly exempt from fasting. The principal passages treating of the fast of Ramadan are found in the second Surah of the Koran, called "The Cow."

Rámáyana, the name of one of the two great epic poems of ancient India (the other, see **MAHÁBHÁRATA**). Its subject matter is the history of Ráma, and its reputed author is Valmiki, who is said to have taught his poem to the two sons of Ráma. But though this latter account is open to doubt, it seems certain that Valmiki was a real

source whence our information of the Ráma incarnation of Vishnu is derived. The Rámáyana contains professedly 24,000 epic verses, or "Slokas," in seven books — some 48,000 lines of 16 syllables. The text which has come down to us exhibits, in different sets of manuscripts, such considerable discrepancies that there are practically two recensions. The one is more concise in its diction, and has less tendency than the other to that kind of descriptive enlargement of facts and sentiments which characterizes the later poetry of India; it often also exhibits grammatical forms and peculiarities of an archaic stamp, where the other studiously avoids that which must have appered to its editors in the light of



RAMSES III.

personage, and, moreover, that the Rámáyana was the work of one single poet — not, like the Mahábhárata, the creation of various epochs and different minds. As a poetical composition the Rámáyana is therefore far superior to the Mahábhárata; and it may be called the best great poem of ancient India. Whereas the character of the Mahábhárata is cyclopædic, its main subject matter overgrown by episodes of the most diversified nature, the Rámáyana has but one object in view, the history of Ráma. Its episodes are rare, and restricted to the early portion of the work, and its poetical diction betrays throughout the same finish and the same poetical genius. Whether we apply as the test the aspect of the religious life, or the geographical and other knowledge displayed in the two works, the Rámáyana appears the older. It is the chief

grammatical difficulty. There can be little doubt that the former is the older and more genuine text.

Rambaud, Alfred Nicolas, a French historian; born in Besançon, Doubs, France, July 2, 1842. Of his works the most important is the "History of French Civilization" (3 vols. 1885), which is used as a text-book in nearly all universities. His other publications include: "French Domination in Germany, 1792-1804" (1874); "Germany under Napoleon I." (1874); "The French and the Russians," etc. (1877); "History of Russia" (1878); "History of Contemporary Civilization in France" (1887); etc. He died in 1905.

Rambouillet, Catherine de Vivonne, Marquise de, a French social leader; born in Rome, Italy, in 1588. In 1600, when only 12 years old, she married Charles d'An-

Rameau

gennes, son of the Marquis de Rambouillet, to whose title and estates he succeeded on the death of the latter in 1611. Her residence at Paris, the Hôtel Rambouillet, for more than 50 years formed the center of a circle which exercised great influence on French language, literature, and civilization. Her circle is said to have suggested Molière's comedy of the "Absurd Précieuses," but this play was not so much directed against it as against the numerous ridiculous coteries which sprang up in imitation. She died in Paris in 1665.

Rameau, Jean Philippe, a French musician; born in Dijon, Sept. 25, 1683. At 18 he went to Milan, but soon returned to France, to Paris, Lille, and Clermont in Auvergne. Here he acted as organist to the cathedral, and wrote his "Treatise on Harmony" (1722). Removing to Paris, he published "Modern System" (1726), "Harmonic Generation" (1737), and "Modern Reflections" (1752). In 1733, at the mature age of 50, he produced his first opera, "Hippolyte and Aricie," the libretto of which was written by the Abbé Pellegrin. It created a great sensation, and Rameau was forthwith elevated to the rank of a rival to Lully. Rameau's best opera was "Castor and Pollux," produced at the Académie Royale de Musique in 1737. Between 1733 and 1760 he composed 21 operas and ballets, as well as numerous harpsichord pieces. Louis XV. created for him the office of composer of chamber music, granted him letters of nobility, and named him a Chevalier de St. Michel. Rameau died Sept. 12, 1764. Rameau's nephew, well known as giving the title to a singular dialogue of Diderot's, which Goethe thought worthy of translation into German, had actual existence, being Louis Sébastien Mercier (1740-1814), author of the famous "Tableau of Paris."

Ramée, Louise de la. See OUIDA.

Ramenghi, Bartolomeo, an Italian painter; born near Ravenna, Italy, about 1484. From the name of his native town he received the name of Bagnacavallo, by which he is most commonly known. He was one of the most distinguished pupils of Francia. Most of his pictures are in Bologna, and notable among them are: "Christ on the Cross," in the Church of St. Petronio, several fine frescoes in other churches, and a "Holy Family" in the Pinacoteca. Ramenghi's work is characterized by an appreciation of "mass" effects, which was later further exemplified by the Impressionistic School. He died in 1542.

Rameses, or Ramses, the name of several Egyptian monarchs, some of whom were known to the Greek and Roman writers and the chronologists; the name signifies "born of the sun," or the "nascent sun." The family is supposed to have been of The-

Rameses

ban origin, and to have been descended from one of the later queens of the 18th dynasty. The exploits of Rameses are confounded by the Greek and Roman authors with those of Sesostris, and mingled in the legend of Aramais, the Danaus of the Greeks. According to the Roman authors Troy was taken in the reign of Rameses II. He is the supposed Sesostris of most authors, and

his sarcophagus and mummy were found in Egypt in 1890. Rameses III. was the chief of the 20th dynasty, the Rhampsinitus of Herodotus, called Meriamoun, or beloved of Ammon, who defeated the Philistines, the Mashuash, and the Libyans, carrying on important wars from the 5th to the 12th year of his reign; he also made conquests in the 16th, and seems to have reigned 55 more years. He founded the magnificent pile of edifices of Medinat Habu, embellished Luxor, Gurnah, and other parts of Egypt. Some attribute to him the exploits of the Rameses of the Greek and Roman writers. In 1889 the sarcophagus and mummies of himself and his queen were discovered in Egypt



RAMSES II.

in a marvelous state of preservation. Rameses IV. reigned a short time and performed no distinguished actions. Rameses V., of whom inscriptions are found in Silsilis. Rameses VI., whose tomb at the Biban-El-Meluk contains some astronomical records, from which the date of his reign has been calculated at 1240 B. C. Rameses VII., VIII., IX., X., and XI., undistinguished monarchs. Rameses XII., who reigned above 33 years, in whose reign the



RAMSES THE GREAT.

statue of the god Chons was sent from Egypt to the land of the Bakhten to cure a princess of the royal family of that court

with which Rameses had contracted an alliance. Rameses XIII. was an important monarch. Rameses is also the name of one of the fortresses or treasure cities built by the Hebrews during their residence in Egypt.

Rameswaram, a low sandy island in the Gulf of Manaar, between the mainland of India and Ceylon. It is about 11 miles long and 6 broad, and contains one of the most venerated Hindu temples in India, the resort of thousands of pilgrims. Pop. 17,854.

Ramie, a plant producing what is popularly known as China grass. The value of ramie as a textile fiber has long been known. China has been making ramie fabrics since the time of Confucius, and the ancient Romans wore robes woven of its silky floss. China not only supplies an enormous home demand, but also exports annually hundreds of millions of pounds of the handmade fiber to foreign lands. The plants, which are indigenous to Asia, are now grown quite extensively in South America and other warm countries. The plant does well in the S. part of the United States and a finer fiber can be grown there than in the tropics. In such a climate the fiber is long, silky and brilliant, and textiles made from it are stronger than linen and have the luster of silk. One obstacle to the general use of this fiber has been the difficulty of extracting the filaments from the rest of the stalk, but a machine has been invented by an American which removes this obstacle and nothing seems to stand in the way of its successful cultivation and utilization.

Ramillies, a village of Brabant, Belgium; 14 miles N. of Namur; memorable as the place near which, May 23, 1706, the French forces under Marshal Villeroy and the Elector of Bavaria were defeated by Marlborough, with the loss of almost all their cannon and baggage, and 13,000 killed and wounded. This victory compelled the French to give up the whole of the Spanish Netherlands.

Ramirez, Ignacio, a Mexican philosopher; born in San Miguel el Grande, June 23, 1818. He was of pure Aztec blood. He published under the pseudonym of "The Necromancer" many satirical poems and philosophical articles; and also founded the paper "Don Simplicio" (Sir Simpleton) in 1846. His many literary works were never collected; but his "Manual of Rudimentary Knowledge," written in 1873, was published in 1884. He died in Mexico, June 15, 1879.

Ramism, the philosophical and dialectical system of Pierre de la Ramée (better known by his Latinized name, Ramus), Royal Professor of Rhetoric and Philosophy at Paris. He was born in 1515, and was one of the victims of the massacre of St.

Bartholomew (1572). He was a strong opponent of Scholasticism, and of the dialectics of Aristotle. In his "Institutiones Dialecticæ" (Paris, 1543) he attempted to provide a new system of logic, which, like Cicero, he strove to blend with rhetoric. That book formed the groundwork of the "Logic" published by Milton in 1672.

Rammohun Roy, a Hindu rajah; born in Rádhánagar, Bengal, in May, 1772. Rejecting the Hindu religion at an early age, he published "A Gift to Monotheists," a protest against idolatry and priestcraft. He embraced the moral principles of Christianity, and issued "The Precepts of Jesus, the Guide to Peace and Happiness" (1820); an English abridgment of the sacred books of the Vedanta (1826); and numerous pamphlets concerning the condition of India. He died in Bristol, England, Sept. 27, 1833.

Ramnagar, two towns of India: (1) a town of the Northwestern Provinces; on the right bank of the Ganges, 2 miles above Benares. It contains a palace, the residence of the rajah of Benares, which rises from the banks of the sacred stream by a number of fine gháts or flights of stairs. There is a fort, and whips and wicker-work chairs are manufactured. (2) A town of the Punjab, on the Chenab river, 28 miles N. W. of Gujranwala. It was a place of great importance in the 18th century, being then known as Rasulnagar, but was stormed by the Sikhs under Ranjit Singh in 1795, and its name changed to Ramnagar. The inhabitants make leathern vessels. A large fair is held here every April.

Rampant, in heraldry, standing upright on the hind legs (properly on one foot only), as if attacking (said of a beast of prey, as the lion). Counter-rampant, said of an animal rampant toward the sinister. When applied to two animals the term denotes that they are rampant contrariwise in saltire, or that they are rampant face to face.

Rampant Gardant, in heraldry, said of same as rampant, but with the animal looking full-faced.

Rampant Passant, in heraldry, said of an animal when walking with the dexter forepaw raised somewhat higher than the mere passant position.

Rampant Regardant, in heraldry, said of an animal in a rampant position and looking behind.

Rampant Sejant, in heraldry, said of an animal when in a sitting posture with the fore-legs raised.

Rampart, in fortification, an elevation or mound of earth round a place, capable of resisting cannon shot, and on which the parapet is raised. The rampart is built of the earth taken out of the ditch, though the lower part of the outer slope is usually

Ramphastos

constructed of masonry. The term in general usage includes the parapet itself.

Ramphastos, the generic name of the toucans.

Rampion, *Campanula Rapunculus*, a plant of the natural order *Campanulaceæ*, or bellworts, indigenous to Great Britain,



RAMPION ROOT AND LEAVES.

as well as to various parts of the continent of Europe. Its root may be eaten in a raw state like radish, and is by some esteemed for its pleasant nutty flavor. Both leaves and root may also be cut into winter salads. Round-headed rampion (*Phyteuma orbiculare*) and spik-

ed rampion (*P. spicatum*) are also British plants, the roots and young shoots of which are occasionally used as an article of food.

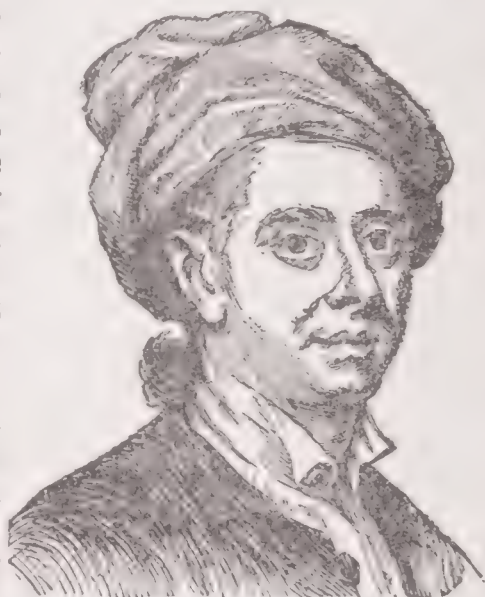
Rampolla, **Mariano del Tindaro**, an Italian clergyman; born in Polizzi, Sicily, Aug. 17, 1843; was a member of the Sicilian aristocracy, which enabled him to reach a very exalted position in the Catholic hierarchy. On the decease of Cardinal Jacobini, the Papal Secretary of State, in 1887, Pope Leo XIII. created Rampolla a cardinal and also appointed him Papal Secretary of State. He at once began to make his influence felt everywhere and particularly in the diplomatic affairs of the Vatican, the modern foreign policy of which has been that of Rampolla's. His principal object was a political alliance with France, in order to ensure the support of that country in the restoration of the temporal power of the Pope. To this end he was the first to discard the French Royalist party. The French Republic was solemnly recognized by him, and the French clerical electorate was encouraged for the first time to vote for the Republican candidates. The Dreyfus affair, however, having given to the French policy a different turn, destroyed entirely the plan he had so laboriously set to work. Rampolla is also the prefect of several congregations, Grand Prior of the Military Order of Malta, and the patron of over 30 different religious associations and corporations. In some of the recent prophecies concerning the next Pope, his name was placed first; but he sacrificed his prospects by resigning in 1903.

Ramsay

Rampur, the capital of a native State of India; in the Northwestern Provinces, on the Kosila river, 110 miles E. by N. of Delhi. It manufactures damask, pottery, sword-blades, and jewelry. Pop. (1891) 76,733.

Rampur Bauleah, chief town of the Rajshahi district of Bengal, India, on the N. bank of the Ganges; is a center of silk and indigo trade, and has an English Presbyterian mission.

Ramsay, **Allan**, a Scotch poet; born in Leadhills, Lanarkshire, Scotland, Oct. 15, 1685. In early youth, he was sent to Edinburgh, and there bound apprentice to a wig-maker, then a profession of a higher grade than it is now esteemed. In 1712, he produced his first poetic effusion, and in 1716, commenced business as a bookseller in Edinburgh, a more fitting and congenial occupation for the poet and literary man.



ALLAN RAMSAY.

In 1720, he published a collection of his fugitive poems, which realized a considerable sum; and in 1724 he issued the first volume of his well-known "Tea-Table Miscellany." His fame, however, reached its acme on the production of "The Gentle Shepherd," one of the finest dramatic pastorals ever penned. In soft and gentle sweetness of expression, and in a rich exhibition of old Scotch manners and habits, interspersed with dramatic touches of nature and character, no Scotch poem has maintained a more permanent or a higher place in the national mind and affections. Some of the higher class poems of Burns can alone compete with it in this respect. Ramsay died in Edinburgh, Jan. 7, 1758.

Ramsay, **Sir Andrew Crombie**, a Scotch geologist; born in Glasgow, Scotland, Jan. 31, 1814. He joined the Geological Survey in 1841; was appointed to the chair of geology at University College, London, 1848; was lecturer at the School of Mines 1851; president of the Geological Society 1862; director-general of the Geological Survey and the Museum of Practical Geology from 1872 to 1881. He was author of "Physical Geology and Geography of Britain," "Geology of Arran," etc. He died Dec. 9, 1891.

Ramsay, Andrew Michael, known as the CHEVALIER RAMSAY, a Scotch-French writer; born in Ayr, Scotland, Jan. 9, 1686. After spending some time at the Universities of Edinburgh and St. Andrews, he went to Leyden. In 1710 he repaired to Cambray, where he was converted to the Roman Catholic faith by Fénelon. He procured the preceptorship to the Duke of Château-Thierry and the Prince of Turenne, and was afterward engaged to superintend the education of Prince Charles Edward Stuart and his brother Henry, afterward Cardinal York. He acquired distinction by his writings, which are chiefly in French. The chief of these are a "Life of Viscount Turenne," a "Life of Fénelon," the "Travels of Cyrus," a romance, and a large work on the "Principles of Natural and Revealed Religion." He died in St. Germain-en-Laye, France, May 6, 1743.

Ramsay, David, an American physician and historian; born in Lancaster co., Pa., April 2, 1749. He studied medicine in Philadelphia and practised in Charleston, S. C., where he soon acquired celebrity. From 1776 to 1785 he distinguished himself in a political capacity, first as a member of the legislature of South Carolina, and afterward as a member of Congress. He labored zealously with his pen to promote the cause of independence of his country; and among his publications are "The History of the American Revolution"; "The Life of Washington"; and "The History of South Carolina." But his most important work appeared after his death, and consisted of a series of historical volumes, entitled, "Universal History Americanized, or an Historical View of the World, from the Earliest Record to the Nineteenth Century," etc., 12 vols. 8vo. He died in Charleston, S. C., May 8, 1815.

Ramsay, Edward Bannerman Burnett, a Scotch clergyman; born in Aberdeen, Scotland, Jan. 31, 1793. He adopted the name of his grand-uncle Sir Alexander Ramsay, by whom he was educated. Educated at Cambridge he took holy orders, and went to Edinburgh in 1823 as a clergyman of the Scotch Episcopal Church, becoming dean of the diocese in 1846. He is best known by his "Reminiscences of Scottish Life and Character," which has had a great popularity. He died in Edinburgh, Dec. 27, 1876.

Ramsay, Francis Munroe, an American naval officer; born in Washington, D. C., April 5, 1835; appointed a midshipman, Oct. 5, 1850; became a rear-admiral in 1894; and was retired on reaching the age limit, April 5, 1897. In the Civil War he participated in the engagements at Haines' Bluff, Yazoo River, Milliken's Bend, and later commanded the gunboat

"Unadilla" of the North Atlantic Squadron. He was superintendent of the United States Naval Academy in 1881-1886; and chief of the Bureau of Navigation in 1889-1897. In September, 1901, he was selected to succeed Rear-Admiral Henry L. Howison on the Schley Court of Inquiry. See SCHLEY, WINFIELD SCOTT.

Ramsbottom, a manufacturing town of Lancashire, England, on the Irwell, 4 miles N. of Bury. The first Sir Robert Peel established calico printing here, and it now has manufactures of cottons, calicoes, ropes, machines, etc. Pop. (1891) 16,726.

Ramsden, Jesse, an English mathematical instrument-maker; born in Salterhebble, near Halifax, Yorkshire, England, in 1735. He began life as a cloth-worker. About 1755 he moved to London, and shortly afterward began to work as an engraver. His skill recommended him to the mathematical instrument-makers, the daughter of one of whom, Dollond, he married. He spent his best efforts in effecting improvements in the sextant, theodolite, equatorial, barometer, micrometer, mural quadrant, etc. He so improved the sextant that its range of error was diminished from 5 minutes to 30 seconds. He made the theodolite for the ordnance survey of England. He devised the mural circle, and made the first for Palermo and Dublin. He spent several years over an instrument for graduating mathematical instruments and published an account of it as "Description of an Engine for Dividing Mathematical Instruments" (1777). For this the Commissioners of Longitude awarded him \$3,075. He was elected a Fellow of the Royal Society in 1786, and was voted the Copley medal in 1795. He died in Brighton, England, Nov. 5, 1800.

Ramsey, Alexander, an American statesman; born near Harrisburg, Pa., Sept. 8, 1815. He studied law and began practice at Harrisburg in 1839. After filling several public offices he was a member of Congress in 1843-1847; appointed governor of the Territory of Minnesota in 1849 and 1859; Secretary of War in 1879; member of the Utah commission in 1881; and president of a bank in 1889. He died April 22, 1903.

Ramsey, Marathon Montrose, an American educator; born in Newton, Mass., in 1867; studied in Spain and Italy, and was graduated at Columbia University in 1894. He was the principal translator for the International American Conference in 1889-1890, and served as a special clerk for the collection and classification of information on foreign military subjects in 1890-1894. In the latter year he accepted the chair of Romance Languages at Columbia University. He was director of the

Ramsgate

Columbian Summer School in 1898-1900. His publications include: "A Text-Book of Modern Spanish" (1894); "An Elementary Spanish Reader"; "Progressive Exercises in Spanish Prose Composition" (1899); "Spanish Literature" and "Spanish-American Literature" (in "Johnson's Universal Cyclopædia," 1896); "Latin-American Literature" (in the "Warner Library of the World's Best Literature," 1897); etc.

Ramsgate, a watering place and seaport of Kent, England, on the Isle of Thanet; 72 miles E. by S. of London, 4 S. S. E. of Margate, and 15 E. N. E. of Canterbury. From a small fishing village it began to increase in importance during the 18th century through successful trade with Russia and the East country, and through the formation here (1750-1795) of a harbor of refuge for the Downs. That harbor, 51 acres in extent, has a sea entrance 250 feet wide, is enclosed on the E. and W. by two piers 670 and 520 yards long. The aspect of the place, which George Eliot calls "a strip of London come out for an airing," is shown in Frith's "Ramsgate Sands" (1854); among its special features are an obelisk marking the spot where George IV. in 1821 embarked for Hanover, an iron promenade pier (1881), the fine Granville Hotel, a beautiful Roman Catholic church by the Pugins, a Benedictine monastery, college, and convent, and a Jewish synagogue and college, erected by Sir Moses Montefiore, who, like the elder Pugin, was a resident. To the N. is Broadstairs, beloved of Dickens; and to the W. Pegwell Bay, with Ebbsfleet, the landing-place of St. Augustine, and also, traditionally, of Hengist and Horsa. Here, too, is Osengall Hill, with an early Saxon cemetery. Pop. (1901) 27,733.

Ramtil Oil, a bland oil similar to sesame oil, expressed from the seeds of a composite annual herb, *Guizotia oleifera*, cultivated in Abyssinia and various parts of India.

Ramus, Pierre, a French logician; born in Cuth, Vermandois, France, in 1515. He distinguished himself at 21, on the occasion of taking his degree, by defending the thesis that "all that Aristotle taught is false." He followed this with "Criticism of Aristotelian Dialectic" (1543), written in Latin; and with his "Dialectic," a French version of his system, the first work of the kind published in the French language. His literary activity produced in all 59 works, all but nine of which appeared before his death. They include treatises on arithmetic, geometry, and algebra. He was assassinated in the massacre of St. Bartholomew, Aug. 24, 1572.

Ranavalona III., a former Queen of Madagascar; born in 1861. She succeeded

Ranching

Queen Ranavalona II. in 1883, having been nominated by her as the future queen. She married the prime minister, Rainilaiarivony (deposed in 1895 and deceased in 1896) soon after ascending the throne. She was crowned in November, 1883. Her kingdom and capital were taken by the French in 1895, and the country was made a French colony. In 1897 she was exiled to Réunion. See MADAGASCAR.

Rancé, Armand Jean le Bouthillier de, the founder of the reformed order of La Trappe; born in Paris, France, Jan. 9, 1626. He embraced the ecclesiastical profession, and held no fewer than six benefices. Residing at Paris, he gave himself up to a life of dissipation. In 1657, however, a marked change took place in his character. He demitted all his benefices except the priory of Boulogne and the abbey of La Trappe. Retiring to the latter place in 1664, he began those reforms which have rendered his name famous (see LA TRAPPE). He died in Soligny-la-Trappe, Orne, France, Oct. 12, 1700.

Ranching, the business of cattle-breeding as pursued on a large scale in the unsettled districts of the United States from the Mississippi to the Pacific coasts, and from the Bad Lands of the Upper Missouri to the Gulf of Mexico. The name is derived from the Spanish rancho, properly "mess" or "mess room," but used in Mexico also for a herdsman's hut, and finally for a grazing farm, as distinguished from a hacienda, a plantation or cultivated farm. The speciality of ranching is that the cattle are raised and kept in a half-wild condition, with little or no house shelter provided and no artificial feeding. The life of the "cowboys" and ranchmen, if no longer so wild and adventurous as it once was, is still sufficiently free, open, and exciting to have great charms for enterprising youths; and among rancheros are to be found not merely hereditary cattle-breeders and rough frontiersmen, but accomplished university-bred men, who in their scanty leisure cherish their Eastern and sometimes Old-World tastes for literature and music. To these are added not a few men whose past history would hardly bear looking into—helping to provide the materials of a strangely mixed society.

Large fortunes were made in the wild old days, but the gradual settlement of the ranching country has seriously embarrassed the business of the ranchman. The old cattle kings of the South often had ranges, under Spanish land-grants, extending over several hundred square miles, and would brand many thousand calves each year. Herds would be "on the trail" for from two to four months, the cattle from Texas crossing the Red River, and passing through Indian Territory and Southern Kansas to the railway; but the gradual settle-

ment of the country and the extension of railways render these long trails impracticable and needless. The great events of the ranchman's year are the "round-up," when stock is taken, the cattle are branded, and such full grown cattle gathered into a herd as are suitable for market; and the departure of the herds for market or port—times of hard work and severe strain for all concerned. In the South there is but one annual round-up; on the more civilized ranges of Wyoming, the Dakotas, Colorado, and Montana there are two round-ups in the year—one early in the spring, to brand the calves and ascertain the losses during winter, another in autumn, when the steers over three years old are separated from the main herd and sent for sale. Besides the branding of ownership there is a special "road-branding" of cattle for identification "on the trail." The cattle in the South are still mainly the coarse, long-horned Texan breed; in the Northwest the original long-horns have been crossed with the fine-grade Northern cattle and much improved in quality, producing larger and less wild cattle, and finer beef.

Rancho, a rude hut where herdsmen and farm-laborers live or only lodge; a farming establishment for rearing cattle and horses. It is thus distinguished from a hacienda, which is a cultivated farm or plantation.

Rand, Edward Augustus, an Episcopal clergyman and writer of juvenile books; born in Portsmouth, N. H., April 5, 1837; was graduated at Bangor Theological Seminary (1865); pastor of several Congregational churches in Massachusetts; entered the Episcopal ministry (1880); founded the Good Shepherd parish, Watertown, Mass., and All Saints' parish, Belmont, Mass. He published: "Christmas Jack" (1878); "Pushing Ahead" (1880); "The Tent in the Notch" (1881); "After the Freshet" (1882); "Little Brown Top" (1883); "Fighting the Sea" (1887); "Sailor Boy Bob" (1888); "When the War Broke Out" (1888); "Two College Boys" (1895); "Two Boys at a Fire" (1900); etc. He died Oct. 5, 1903.

Rand, The, or White Waters Range, a small tract of land, extending 25 miles either side of Johannesburg, South Africa, and famous for its mineral wealth. It resembles anything but a mining district, having the appearance of a grazing country. The reefs are accessible and rather easily worked. The deposits are unique in their unparalleled persistence of ore, which is interspersed in the quartz and sandstone. It is not of very high quality, yielding about \$10 per ton. There are about 10,000 stamps in the district, which can crush 7,000,000 tons a year. The Boer War passed over Johannesburg without doing any vital

damage to the plants. Since its discovery in 1885, the Rand has yielded \$400,000,000 in gold, and just before the war was yielding at the rate of \$100,000,000 a year, or one-third of the world's production, a rate which some years before was but \$35,000,000 a year. The reefs are over a mile deep, and conditions favor deep mining. The increment in temperature is only 1° for 200 feet, so mines can be sunk down 10,000 feet. The deposits, however, are not, as asserted, practically unlimited.

In South Africa centuries of mining history are compressed into decades, and they hold the world's record in mining for rapidity in exploitation, drilling, and hoisting. At Kimberley, 2,000 tons were hoisted up a 1,600-foot shaft in one day, while at Simla-Jack a 22 by 20 shaft was lowered about 2,200 feet in one month. South Africa rivals the United States in disrespect for tradition. In fact, its brightest pioneers are Americans, and the leading figure among Johannesburg engineers is Hennen Jennings, a Harvard graduate. There are many problems ahead of the Rand, the chief being that of power. There are no navigable rivers, and practically no waterfalls. The Kaffir, of whom there are 100,000 in the Rand, is lazy and dissolute, and the Boer War made him worse and scarcer; while the climate makes white menial labor impossible.

Randall, Alexander Williams, an American statesman; born in Ames, N. Y., Oct. 31, 1819; received an academic education; was admitted to the bar and began practice in Waukesha, Wis., in 1840; became postmaster there, and in 1847 was elected to the convention that framed the State constitution. He was elected to the State Assembly in 1855; governor of Wisconsin in 1857 and in 1859, and was appointed United States Minister to Italy in 1861. On his return he was made assistant postmaster-general, and served in that capacity till March, 1869. He died in Elmira, N. Y., July 25, 1872.

Randall, Emilius Oviatt, an American author; born in Richfield, O., Oct. 28, 1850; was graduated at Cornell University in 1874; took a course in technical training at the Law Department of the Ohio State University; was admitted to the bar in 1890 and accepted the chair of law at the Ohio State University in 1893; became secretary of the Ohio State Archaeological and Historical Society in 1894, and official reporter of the Ohio Supreme Court in 1895. He was identified with the Sons of the American Revolution, the American Library Association, the American Bar Association, and the American Historical Association. His publications include "History of Blennerhasset" (1899) and "History of

the Separatist Society of Zoar" (1899). He was also the editor of "Bench and Bar of Ohio" (2 vols.); "Ohio State Reports of the Supreme Court Decisions" (12 vols.); etc.

Randall, George M., an American military officer; born in Ohio, Oct. 8, 1841. He was graduated at the United States Military Academy, and commissioned 2d lieutenant in the 4th Infantry in 1861; was promoted 1st lieutenant in 1862; captain in 1865; major of the 4th Infantry in 1891; and colonel of the 17th Infantry, Aug. 8, 1898; and was transferred to the 8th Infantry, Sept. 16, following. In the volunteer service he entered the Union army as a private in the 4th Pennsylvania Infantry, April 20, 1861; became major of the 14th New York Artillery in 1864, and lieutenant-colonel, June 1, 1865, being mustered out on Aug. 26, following. In the war with Spain he was commissioned a Brigadier-General of volunteers, May 4, 1898; was honorably discharged under this commission on April 12, 1898; was reappointed Brigadier-General, Jan. 20, 1900; and on the reorganization of the regular army in February, 1901, was promoted Brigadier-General, U. S. A.

Randall, James Ryder, an American journalist and composer; born in Baltimore, Md., Jan. 1, 1859; was educated at Georgetown College, D. C. He taught for a while in a Louisiana college, and then turned to journalism. Shut out from the army by a delicate constitution, he still gave powerful aid to the Southern cause by his lyrics. These include, besides "Maryland, My Maryland" (1861; called forth by news of the passage of the first Massachusetts troops through the streets of Baltimore, and the consequent bloodshed); "Stonewall Jackson"; "There's Life in the Old Land Yet"; etc. After 1866 he lived in Augusta, Ga. He died Jan. 15, 1908.

Randall, Samuel Jackson, an American statesman; born in Philadelphia, Pa., Oct. 10, 1828. In 1862 he was elected to Congress, serving continuously till his death. He was Speaker of the House, 1876-1881. As such he used his influence in guiding the House through the dangerous crisis produced by the uncertainty of the presidential election of 1876. He died in Washington, D. C., April 12, 1890.

Randell, Choice B., an American lawyer; born in Murray co., Ga., Jan. 1, 1857; received a common school education and studied at the North Georgia Agricultural College; was admitted to the bar in 1878 and settled in Texas in the following year; was elected to Congress as a Democrat in 1901; and in 1902 was a member of the Committees on Elections (No. 3) and on Expenditures in the War Department.

Randolph, Alfred Magill, an American clergyman; born in Winchester, Va., Aug. 31, 1836; was graduated at William and Mary College in 1855 and at the Virginia Theological Seminary in 1858; was ordained in the Protestant Episcopal Church; became rector of St. George's Church, Fredericksburg, Va., in 1858, and remained there till the assault on the town by the Union troops in 1862. He was a chaplain in the Confederate army in 1863-1865, and was pastor of Emmanuel Church, Baltimore, Md., in 1867-1883. In the latter year he was elected assistant bishop of Virginia.

Randolph, Edmund Jennings, an American statesman; born in Williamsburg, Va., Aug. 10, 1753; studied at William and Mary College, and was admitted to the bar. In 1776 he helped to frame the constitution of Virginia, and became the State's first attorney-general. In 1786-1788 he was governor of Virginia, and in 1787 a member of the convention which framed the Constitution of the United States. He was working hard at a codification of the State laws of Virginia when, in 1789, he was appointed by Washington Attorney-General of the United States. In 1794 he was made Secretary of State, but after the President's signing of the Jay Treaty (1795) with England he resigned in order to be free to vindicate his own conduct. Meanwhile he was practically ruined by the responsibility which he had incurred, as part of the duties of his office, for certain funds provided for foreign service; and, though he returned to the bar, he had to assign his lands and slaves. He died in Clarke co., Va., Sept. 13, 1813.

Randolph, John, "of Roanoke," an American statesman; born in Cawsons, Chesterfield co., Va., June 2, 1773. He claimed descent from Pocahontas, the Indian princess. He was educated for the legal profession, which, however, he never followed, devoting his attention to politics. In 1799, he was elected to Congress, where he soon became conspicuous, his fluency, wit, and sharpness of retort making him the acknowledged leader of the administration party. His opposition to the War of 1812 caused his defeat in the following election; but he was reelected to Congress in 1814, where he remained for several years. Visiting England in 1822 and 1824, he attracted considerable attention by his singularity of manners and costume. From 1825 to 1827 he was a United States Senator. In 1829 he was a member of the convention for revising the constitution of Virginia, and the year following was appointed United States minister to Russia, remaining, however, most of the time in England, owing to ill health. On his return, he was again elected to Congress, but was unable to occupy his

Randolph

seat. He died in Philadelphia, Pa., June 24, 1833.

Randolph, Sarah Nicholas, an American biographical writer, great-granddaughter of Thomas Jefferson; born in Edge Hill, Va., Oct. 12, 1839. She published: "The Domestic Life of Thomas Jefferson" (1871); "The Lord Will Provide" (1872); "A Paper on Martha Jefferson Randolph" (1876); and "Life of Stonewall Jackson" (1876).

Randolph, Thomas, an English poet and dramatist; born in Houghton, Northamptonshire, England, in 1605. He was educated at Westminster and Cambridge, and was admitted to a fellowship. He early began to write, and gained the friendship of Sir Aston Cokain, Shirley, and Ben Jonson, who adopted him among his poetic "sons." He seems to have lived a boisterous life. He left a number of bright, fanciful, and occasionally too glowing poems, and six plays: "Aristippus, or the Jovial Philosopher"; "The Conceited Peddler"; "The Jealous Lovers"; "The Muses' Looking Glass"; "Amyntas, or the Impossible Dowry"; and "Hey for Honesty." He died in March, 1635.

Randolph-Macon College, an educational institution in Ashland, Va.; founded in 1830, under the auspices of the Methodist Episcopal Church, South; has grounds and buildings valued at \$150,000; productive funds, over \$210,000; volumes in the library, 11,000; scientific apparatus, etc., \$7,000; ordinary income, \$30,000; average number of faculty 15; students, 140.

Ranelagh, a building erected in 1742 on the site of the gardens of a villa of the last Earl of Ranelagh at Chelsea, London, England. Its rotunda was 150 feet in diameter, with an orchestra in the center and tiers of boxes all round. The chief amusement, promenading, as it was called, was going round and round the area below, and taking refreshments in the boxes, the orchestra performing meanwhile. Ranelagh was a fashionable and notorious place of resort in 1740-1803. Its last public appearance was when the installation ball of the Knights of the Bath was given there in 1802. It was closed Sept. 9, 1803, and built on next year. Its site is now part of the Chelsea Hospital garden.

Range, in gunnery: (1) The horizontal distance to which a projectile is thrown. Strictly, it is the distance from the muzzle of the gun to the second intersection of the trajectory with the line of sight. A cannon lying horizontally is called the right level or point-blank range; when the muzzle is elevated to 45° it is called the utmost level. (2) A place where gun or rifle prac-

Rank

tice is carried on. In music, the whole ascending or descending series of sounds capable of being produced by a voice or instrument; the compass or register of a voice or instrument. In natural science, the geographical limits within which an animal or plant is now distributed, and the limits in point of time within which it has existed on the globe. The first is called range in space, and the second range in time. In the case of marine animals, as the Mollusca, there is also a range of depth, as measured by the number of fathoms which constitute their superior and inferior limits. As a nautical term: (1) A length of cable a little in excess of the depth of water, ranged on deck ready to run out when the anchor is let go. (2) A large cleat in the waist for belaying the sheets and tacks of the courses.

Range Finder. See FINDER.

Rangoon, the capital of Lower Burma, and the chief seaport of Burma, at the junction of the Pegu, Hlaing or Rangoon, and Pu-zun-doung rivers; about 21 miles from the sea. Since its occupancy by the British in 1852 Rangoon has undergone such changes that it is practically a new town, and its population has increased five-fold. The principal streets are broad, and contain many large and not a few handsome buildings. There are the law courts, post-offices, Bank of Bengal, custom house, Anglican and Roman Catholic churches, St. John's College, high school, etc. A large and increasing commerce is carried on with British, Indian, and Chinese ports; and an extensive trade is conducted with inland towns as far as Mandalay. The chief exports are rice, timber, cotton, hides, gums and resin, mineral oil, ivory, precious stones; the imports being mainly manufactured goods. A number of rice mills have been erected; there is a government dockyard, and steam tram cars have been introduced. Pop. (1901) 234,881.

Ranjit Singh, the founder of the Sikh kingdom in the Punjab, India; born in Gujranwala, Nov. 2, 1780. He was the son of a Sikh chief. His father died when he was 12 and his mother when he was 17 years old. He at once began to show his ambition and capability for rule, and after the Shah of Afghanistan had given him the province of Lahore, he directed all his energies to the founding of a kingdom which should unite all the Sikh provinces under his own personal rule. He procured from an Afghan prince, as the price of his assistance in war, the famous Koh-i-nur diamond (see DIAMOND). He died June 27, 1839.

Rank, a line of soldiers standing abreast or side by side; often used along with "file," which is a line running from the front to the rear of a company, battalion.

Rank

or regiment, the term "rank and file," thus comprising the whole body of the common soldiers.

Rank, in the army and navy, a grade of various officers established by law, each one carrying distinct rights, privileges, and emoluments. Official etiquette often prescribes that certain functions shall be performed by officers of certain grades, and that an officer is entitled to have an officer of equal rank to treat with. In order to facilitate communications between officers of the United States army and navy in accordance with the principle of equality in rank, as well as to enable them to communicate with similar officers of foreign countries, a correspondence has been established between military and naval ranks. Before the abolition of the four offices the general of the army ranked equal with the admiral of the navy, and the lieutenant-general with the vice-admiral. After this the officers ranked as follows: Major-generals with rear-admirals; brigadier-generals with commodores; colonels with captains; lieutenant-colonels with commanders; majors with lieutenant-commanders; captains with lieutenants; first lieutenants with masters; and second lieutenants with ensigns. Chiefs of naval bureaus, usually captains, ranked as commodores while holding bureau assignments, and after vacating them resume their lineal rank.

If a naval officer is assigned to a duty or command that would ordinarily be given to an officer of a higher rank he is advanced to that rank, either full or acting, for the period of the assignment. Thus a captain may become an acting rear-admiral in an emergency, and at its termination go back to his regular rank of captain pending promotion to the full higher rank. A chaplain ranks as a captain of cavalry in the army, and as a captain in the navy. The superintendent of the United States Military Academy ranks as a colonel in the army, but the superintendent of the Naval Academy is not restricted to high rank; he may be a commander, captain, or rear-admiral. A flag-officer is a naval officer of sufficiently high rank to entitle him to command a fleet or a subdivision of one. During the American Civil War there were three grades of flag-officer, admiral, vice-admiral, and rear-admiral. The ship from which he directs operations by means of signals is called the flagship, and is immediately commanded by a captain. Captains command ships of high rating; commodores, formerly, squadrons of not less than four ships. In the army brigadier-generals command brigades, and major-generals, divisions and corps, the last being the largest body in the army as constituted for the war with Spain.

Ranke

In 1904, under several acts of Congress, the highest rank in the army was the revived one of lieutenant-general; and in the navy that of admiral. The last Naval Personnel Bill abolished the rank of commodore, enlarged the number of rear-admirals, and divided the latter into two classes of nine each, the first ranking with major-generals and the second with brigadier-generals. In 1911 there were 28 active rear-admirals.

Ranke, Leopold von, a German historian; born in Wiehe, between Gotha and Halle, Dec. 21, 1795. Though he studied theology and philology at Halle and Berlin, and in 1818 began to teach at the gymnasium of Frankfurt-on-Oder, his chiefest thoughts were given to the study of history, to which they were directed principally by his Luther studies and reading Scott's romances. The works,



LEOPOLD VON RANKE.

"A History of the Roman and German People from 1494 to 1535" (1824) and "A Criticism on Modern Historians" (1824), procured him a call to Berlin as Professor of History in 1825. The latter of these works and *Analecta* to his subsequent books, expound his views of the functions of history, and the methods of the ideal historian. History is the record of facts. It should know nothing of the political party, or Church politics, or subjective views of the writer. It should be based on sound documentary evidence, critically examined and sifted. In 1827 he was sent by the Prussian government to consult the archives of Vienna, Venice, Rome, and Florence; four years he spent in this work, and returned with a mass of the most valuable historical materials. The results of his labors were seen in "The Princes and Peoples of Southern Europe in the 16th and 17th Centuries" (1827), and other books dealing with Servia, Turkey, and Venice; and "The Roman Popes in the 16th and 17th Centuries" (1834-1837; 9th ed. 1889), perhaps the most finished of his books, certainly one of his great masterpieces of historical writing. Then he turned his attention to Central and Northern Europe, and wrote in quick succession "German History in the Early Reformation" (1839-1847); "Twelve Books on

Prussian History” (1847-1848); “**History of the French**” (1852-1861); “**English History**” (1859-1867), the last two treating chiefly of the same two centuries as the books on South Europe; and “**German History from the Reformation to the Thirty Years’ War**” (1869). Later periods and special periods of German history are treated of in books on the “**Origin of the Seven Years’ War**” (2d ed. 1874), the “**German Powers and the Confederation**” (1871); the “**History of Germany and France in the 19th Century**” (1887), and monographs on Wallenstein (1869), Hardenberg (5 vols. 1877-1878), and Frederick the Great and Frederick William IV. (1878). To the above must be added a book on the revolutionary wars of 1791 and 1792 (1875), another on Venetian history (1878), and “**The Universal History**,” of whose nine volumes (1881-1888) he lived to see only seven published. This last work, which is the copestone of Ranke’s historical labors, was begun when he was an old man of 82; yet at that great age he kept two schooled historical assistants busy, studied critically the Greek and other sources, dictated and worked 8 to 10 hours a day, and published one volume a year regularly, till he died, May 23, 1886, having rested from his beloved work only a few short days. Even his long life—he was over 90 when he died—would hardly have sufficed for the thorough works he accomplished had he not been a man of unwearied industry, with a marvelous memory, and a swift and intuitive judgment as to the value of historical material. His style is not brilliant, yet sufficiently clear and interesting. He always wrote from the standpoint of one who had the whole history of the world before his mind’s eye. This and his skill in the portraiture of historical personages often lend the deepest interest to his narratives. His point of view was, however, that of the statesman; and he fails to give due prominence to the social and popular sides of national development. Ranke married an Irish lady in 1843, and was ennobled in 1865. He continued to lecture till 1872. His lectures exercised a great influence upon those who sat at his feet to learn, as is seen in the works of the great school of historical writers, Waitz, Von Sybel, Giesebrecht, and others. A collected edition of his “**Works**” was published at Leipsic in 47 volumes in 1868; several of them have been translated into English.

Rankin, Jeremiah Eames, an American clergyman and writer; born in Thornton, N. H., Jan. 2, 1828; was graduated at Middlebury College, Vt., in 1848; became president of Howard University in 1889. He wrote several National hymns, including “**For God and Home and Native Land**”

and “**Keep Your Colors Flying**.” He was also the author of “**Bridal Ring**” (1866); “**Auld Scotch Mither**” (1873); “**Subduing Kingdoms**” (1881); “**The Hotel of God**” (1883); “**Atheism of Heart**” (1884); “**Christ His Own Interpreter**” (1884); “**Ingleside Rhaims**” (1887); “**Word and Song**”; “**The Cup the Father Giveth**”; etc. He died Nov. 28, 1904.

Rankine, William John MacQuorn, a Scotch civil engineer; born in Edinburgh, Scotland, July 5, 1820. He received his instruction in natural philosophy from Professor Forbes, his practical training as an engineer from Sir J. Macneill, and he became himself Professor of Engineering at Glasgow University in 1855. His numerous contributions to the technical journals have been reprinted (London, 1881), and he was the author of text-books on “**Civil Engineering**,” “**The Steam Engine**,” “**Applied Mechanics**,” “**Shipbuilding**,” etc. He was especially successful in investigating mathematically the principles of mechanical and civil engineering. He was also well known as a song-writer. He died in Glasgow, Dec. 24, 1872.

Ranney, William, an American artist; born in Middletown, Conn., May 9, 1813; learned drawing in Brooklyn, N. Y. At the outbreak of the war between Texas and Mexico he enlisted with the Texans. During the struggle he met many guides and trappers from the West, and after his return to Brooklyn spent most of his time in portraying their life and habits. His works include “**Boone’s First View of Kentucky**”; “**On the Wing**”; “**Washington on His Mission to the Indians**” (1847); “**Duck-Shooting**” (in the Corcoran Gallery, Washington); “**The Sleigh Ride**”; “**The Trapper’s Last Shot**”; etc. He died in West Hoboken, N. J., Nov. 18, 1857.

Rannoch, Loch, a lake of Perthshire, Scotland, 35 miles N. N. W. of Perth, 11 miles long, and about 1 mile average breadth. It contains two islands, and has an outlet for its waters in the Tummel, a tributary of the Tay. W. from the loch extends the Moor of Rannoch, which is 28 miles long by 16 miles broad.

Ransdell, Joseph Eugene, an American lawyer; born in Alexandria, La., Oct. 7, 1858; received a public school education and was graduated at Union College in 1882; was admitted to the bar in 1883, and began practice in his native State. In 1884-1896 he was district attorney of the 8th Judicial District of Louisiana, and in 1896-1899 was a member of the levee board of the 5th Louisiana Levee District. On Aug. 29, 1899, he was elected to Congress as a Democrat to fill a vacancy; in 1901 was reelected; and in 1902 was a member

Ransom

of the Committee on Rivers and Harbors. In 1898 he was a member of the Louisiana Constitutional Convention and exerted a large influence in the drafting of the new State constitution. He was deeply interested for many years in the construction and maintenance of the levees on the Mississippi river.

Ransom, in ordinary language, release from captivity or bondage by payment. Also the money paid for the release of a person from captivity, bondage, or slavery, or for the redemption of goods captured by an enemy; that which procures the release of a captive or of goods captured, and restores the former to liberty and the latter to the original owner. Or a price paid or offering made for procuring the pardon of sins, and the redemption of the sinner from the consequences of sin (Mark x: 45). Formerly, atonement, expiation. In feudal law, a sum paid for the pardon of some great offense, and the discharge of the offender; or a fine paid in lieu of corporal punishment.

Ransom, Thomas Edward Greenfield, an American military officer; born in Norwich, Vt., Nov. 29, 1834. Before the Civil War he was an engineer in Illinois; became a lieutenant-colonel of volunteers in July, 1861; was severely wounded at Fort Donelson in 1862; commanded a regiment at Shiloh in April, 1862; was promoted Brigadier-General in January, 1863; served under General Banks in the Red River expedition; and was severely wounded at Sabine Cross-Roads, La., in April, 1864. When his wound had healed he joined Sherman's army and took command of a division just before the capture of Atlanta, Sept. 2, 1864. He died in Rome, Ga., Oct. 29, 1864.

Ranters, a name given by way of reproach to a denomination of Christians which sprang up in 1645. They called themselves "Seekers," the members maintaining that they were seeking for the true Church and its ordinances, and the Scriptures, which were lost. The name "Ranters" is also vulgarly applied to the Primitive Methodists, who formed themselves into a society in 1810, and who were in favor of street preaching, camp meetings for religious purposes, as also of females being permitted to preach.

Ranunculaceæ, crowfoots; an oruer of hypogynous exogens. Herbs, rarely shrubs, leaves often much divided, with dilated, half-clasping petioles, often with processes like stipules. Flowers typically polypetalous, large, gaily-colored, sometimes apetalous, but with colored sepals. Sepals three or six, stamens generally indefinite, carpels numerous, one-celled or united into single, many-celled pistil. Fruit dry achenes, ber-

Rap

ries, or follicles. Found in cold damp places in Europe, North America, etc. They are acrid, and often poisonous. Tribes: Clemateæ, Anemoneæ, Ranunculeæ, Helleboreæ, and Actææ. Known genera 41, species 1,000 (Lindley). Genera 30, species 500. (Sir J. Hooker.)

Ranunculus, buttercup, crowfoot; the typical genus of the order *Ranunculaceæ*. Sepals five, rarely three, caducous; petals



RANUNCULUS.

five, or more, or wanting, glandular at the base; stamens many; fruit of many achenes, each with one ascending seed. Known species about 160, from temperate regions. Many have much divided leaves. Of these *R. repens*, common on waste ground, has the peduncles furrowed. *R. bulbosus* has bulbous roots and reflex sepals, *R. acris* is tall and branched, *R. lingua* is the greater, and *R. flammula* the lesser spearwort. The latter is a vesicant and epispaetic. *R. sceleratus* was formerly used by beggars to create artificial sores; it is poisonous when raw, but is eaten boiled by the Wallachians. The juice of *R. thora* was used by the Swiss hunters to envenom their javelins. *R. glacialis* is a powerful sudorific. Many species are very beautiful, and are cultivated in gardens.

Ranz des yaches (French = the ranks or rows of cows, because the cattle on hearing the call move off in rows), the tunes or flourishes blown by Swiss shepherds on their cow-horns or Alpine-horns (long tubes of fir wood), as signals to the animals under their charge. They consist of a few broken intervals.

Rap, familiar in the phrase "not a rap," a counterfeit Irish coin of the time of George I., which passed for a half-penny, though not really worth a fourth of that

Rape

value. There was also a small Swiss coin called "rappen," worth a centime.

Rape, in law, carnal knowledge of a woman by force against her will. Consent obtained by duress or threats of murder is nugatory. Rape is a felony punishable with imprisonment for life, or for a term of years, or with death. The age of consent on the part of the female varies in different States from 10 to 16 years. Carnal knowledge of a female under the age of consent is rape.

Rape, two species of *Brassica*. Summer rape is *B. campestris*, and winter rape *B. napus*. Sir J. Hooker regards the latter as



RAPE: BRASSICA NAPUS.
a, silique.

a sub-species of the former, and the turnip as another sub-species. *B. campestris* proper has the root tuberous, the radical leaves hispid. It is the Swedish turnip. *B. napus*, the rape properly so called, has the root fusiform, and the leaves all glabrous and glaucous. It is cultivated as a salad plant, and is sometimes also used in lieu of greens. Some-

times it is called also cole seed.

Rape Cake, a hard cake formed by pressure of the seeds and husks of rape after the oil has been expressed. It is used for feeding cattle and sheep, and also has a high reputation as a rich manure.

Raphael, Raffaello Sanzio, or Santi d'Urbino, the greatest of modern painters, and head of the Roman school; born in Urbino, Italy, March 28, 1483. He received his earliest instructions from his father, Giovanni Santi, after whose death, in 1494, he became the pupil of Perugino, with whom he remained at Perugia and other places for several years. In 1504 he visited Florence, and chiefly lived there till 1508, when he was called to Rome by Pope Julius II., and employed to paint the *stanze* (chambers) of the Vatican. Raphael spent the rest of his short life at Rome, where he formed a numerous school of painters, among whom the most eminent were Giulio Romano, Gian Francesco Pennis, Pierino del Vaga, Polidoro da Caravaggio, and Ga-

Raphael

rofolo. In the numerous works, frescoes, and oil paintings of this unrivaled master, three styles are distinctly recognizable. The first is the "Peruginesque," in which sentiment predominates, and was the pure imitation of his master's manner. The sec-



RAPHAEL.

ond is the "Florentine," marked by a great advance in respect to form and dramatic composition; it was the result of his studies at Florence, where he was impressed by the cartoons of Leonardo da Vinci and Michael Angelo, and the works of Masaccio, Francia, and Fra Bartolomeo di San Marco. The third style is called the "Roman," and is peculiarly Raphael's own—that which constitutes him the greatest of painters. Its supreme excellence is the equable development of all the essential qualities of art, composition, expression, design, coloring; thus forming a truthful representation of nature, both in the grandest conceptions and in the minutest details. It is impossible here to name more than a very few of the works of Raphael, who is distinguished above other painters by the fact of having executed no merely commonplace work. Of the paintings executed before his visit to Florence must be named "Coronation of the Virgin," now in the Vatican, and the "Sposalizio, or Marriage of the Virgin," in the Brera at Milan. Among those in his second manner are the "Entombment of Christ," in the Borghese gallery at Rome; the "Madonna del Baldacchino," in the Pitti Palace at Florence; the "Madonna del Gran Duca," in the same palace; and the grand fresco, "Theology," or "Dispute on the Sacrament," the first he executed in the Vatican. "The School of Athens," or "Philosophy," painted in 1511, first showed traces of his third and highest style. It was followed by the

"Parnassus," or "Poetry," "Jurisprudence," "Expulsion of Heliodorus from the Temple of Jerusalem," founded on a narra-

tino, though designed by Raphael, were chiefly painted by his scholars; to whom he was compelled, by the innumerable com-



SCHOOL OF ATHENS BY RAPHAEL.

tive in the book of the Maccabees; the "Mass of Bolsena," "Attila," and "Deliverance of St. Peter from Prison." These missions given him, to intrust the execution of many of his later works. The *loggie* (colonnades) of the Vatican were decorat-



DIVIDING THE LAND BY RAPHAEL.

frescoes are in the Stanza della Segnatura, and Stanza dell' Eliodoro. The frescoes in the Stanza dell Incendio, and de Constan-

ed under his direction; the sublime works of Michael Angelo in the Sistine chapel stimulated him in the production of his

Raphania

"Isaiah" and "Sybils"; and in 1515 he prepared the "Cartoons" for the tapestry of the Sistine chapel, three of which are lost, and the other seven, sent to Flanders, were bought by Charles I., and now form part of the National Collection in South Kensington Museum, London. Among Raphael's oil paintings are the "St. Cecilia," at Bologna; the famous "Madonna di San Sisto," now in the Dresden gallery; the "Spasimo di Sicilia," now at Madrid; and the "Transfiguration," his last work, and perhaps at once the *chef-d'œuvre* of Raphael and of painting. It is now in the Vatican. His drawings are very numerous, and are to be found in most of the public and private museums of Europe. Raphael, who had occupied himself with architecture as well as painting, was charged, on the death of his friend Bramante, in 1514, with the direction of the building of St. Peter's. Raphael died in Rome from the effects of a cold caught in the Vatican, and after an illness of a fortnight, on his 37th birthday, April 6, 1520. His body lay in state, and was interred with great pomp in the Pantheon. His school was dispersed at the sack of Rome, seven years after his death.

Raphania, or **Raphany**, a disease, a "train of morbid symptoms, produced by the slow and cumulative action of a specific poison peculiar to wheat and rye, and which gives rise to convulsions, gangrene of the extremities, and death." The name was given to it by Linné, who thought its symptoms were dependent upon the administration of *Raphanus raphanistrum*, or jointed charlock, with the wheat used as food. Called also ergotism.

Raphe, in botany, the vascular cord communicating between the nucleus of an ovule and the placenta, when the base of the former is removed from the base of the ovulum.

Raphia. See **RAFIA**.

Raphides, needle-shaped transparent bodies, lying either singly or in bundles among the tissue of plants; any crystalline formation in a vegetable cell. The former commonly consist of oxalate of lime.

Rapidan, a river of Virginia, flowing S. and E. from its headwaters in the Blue Ridge Mountains, and becoming the chief tributary of the Rappahannock about 12 miles above Fredericksburg after a course of 80 miles. During the Civil War, parts of the river were the scene of much military activity by the armies of both sides.

Rapid-fire Guns. See **MACHINE GUN**.

Rapier, a light, highly-tempered, edgeless, and finely-pointed weapon of the sword kind used for thrusting. It is about three feet in length, and was long a favorite

Rapp

weapon for duels. Its use now, however, is restricted to occasions of state ceremonial.

Rapin de Thoyras, Paul de, a French historian; born in Castres, Languedoc, France, March 25, 1661. He is remarkable for the production of a "History of England" (1724), to which he devoted 17 years' labor. It undoubtedly shortened his life, and he survived its publication but a year. It is considered one of the most complete and impartial expositions of English political events ever published. He also wrote: "A Dissertation on the Whigs and Tories" (1717). He died in Wesel, Holland, May 16, 1725.

Rapp, George, a German-American socialist, founder of the sect of Economites; born in Würtemberg, in 1770. After an attempt to restore the Church of New Testament days in Germany, he emigrated with his followers to Western Pennsylvania in 1803. There he established a settlement which he named Harmony (whence the early title of the sect, Harmonists or Harmonites). In 1815 the community removed to Indiana, and founded New Harmony; but this was sold in 1824 to Robert Owen, and Rapp and his followers returned to Pennsylvania, where they built Economy, a village on the right bank of the Ohio, 15 miles N. W. of Pittsburg, and engaged in farming. Impressed with the certainty of the speedy second coming of Christ, his absorbing aim was to amass great wealth, to be placed then at the Lord's disposal. To this end he and his followers practised a rigid economy, and lived a life of toil and self-denial, in which celibacy formed a part; and with the same object, all things were held in common. As the years passed the community became wealthy. Its numbers, however, have not increased, and in 1890 did not exceed 70. He died in Economy, Pa., Aug. 7, 1847.

Rapp, Jean, Comte, a French military officer; born in Colmar, Haut-Rhin, France, April 27, 1772. He was intended for the Church, but his taste for a military life led him to enroll himself (1788) in the mounted "chasseurs" of the French army. Rapp distinguished himself by dashing gallantry in Germany and Egypt, and on the death of Desaix at Marengo he became aide-de-camp to Napoleon. His brilliant charge at Austerlitz on the Russian Imperial Guard was rewarded with the grade of general of division (1805). For his services at Lobau he was named a count of the empire (1809). He opposed the Russian expedition, but accompanied the emperor throughout the whole of it. His obstinate defense of Danzig for nearly a year against a powerful Russian army gained for him greater renown, and his chivalrous and considerate

Rappahannock

treatment of the unfortunate inhabitants during the siege was warmly appreciated by them. The Russians, contrary to the articles of capitulation, sent Rapp and his garrison prisoners to Russia, and he did not return to France till July, 1814. On reaching Paris he was well received by Louis XVIII.; but in 1815 he went over to his old master, and was appointed Commander-in-Chief of the army of the Rhine, and peer of France. After Waterloo Rapp again submitted to Louis. Recreated a peer of France (1819), he held various offices about the court, and died in Paris, Nov. 8, 1821.

Rappahannock, a river of Virginia, rising in the Blue Ridge of the Alleghany Mountains, receiving the Rapidan (above this point it is sometimes called the North Fork), and flowing about 125 miles S. E. to Chesapeake Bay. It is tidal and navigable to Fredericksburg. The Rappahannock and the Rapidan were the scenes of some of the most sanguinary battles of the Civil War, at Fredericksburg, Chancellorsville, and the Wilderness.

Rappee, a strong kind of snuff of either a black or brown color; it is made from the darker and ranker kinds of tobacco leaves.

Raptores, Swainson's name for the Accipitres of Linnæus (which is being revived by some taxonomists), corresponding to the Aëtomorphæ of Huxley. Bill strong, curved, sharp-edged, and sharp-pointed, often armed with a lateral tooth. Upper mandible the longer, strongly hooked at tip. Body very muscular, legs robust, short; three toes in front, one behind, all armed with long, curved, crooked claws; wings commonly pointed and of considerable size; flight usually rapid and powerful. The raptore were formerly divided into two sections: Nocturnal, containing the owls; and diurnal, containing the hawks, eagles, falcons, and vultures. The modern order *Accipitres* has three sub-orders: *Falcones*, *Pandiones*, and *Striges*. They appear first in the Tertiary.

Raratonga, or **Rarotonga**, an island in the South Pacific Ocean, belonging to the group of the Hervey Islands; 53 miles in circumference; pop. 3,000. It consists of a mass of mountains, becomes visible at a great distance, and has a very romantic appearance. The inhabitants have been converted to Christianity. The island belongs to Great Britain.

Rarefaction, in physics, the act of rendering more rare, *i. e.*, less dense. Used specially of the diminution in the density of the air in the receiver of an air pump, or at great altitudes. It is produced by the increase in the size of the spaces between the particles of air or other gases, so

Rashi

that the same number of particles occupies a larger space than before rarefaction began. Called also dilitation.

Rarey, John S., an American horse tamer; born in Franklin co., O., in 1828. At an early age he evinced natural ability in the management of horses, which he afterward developed by observation and study. In 1856 he went to Texas, and on his return to Ohio he began to give public exhibitions of his skill, subduing the most vicious and wildest horses and making them obedient to his will. He always deprecated severe methods in the treatment of these animals, and relied on kindness. About 1861 he visited Europe, where, in England especially, he met with great success. Royal persons, in Russia, in Paris, and in London, witnessed and were amazed at his mastery over the most vicious steeds that could be obtained and were submitted to his treatment. He died in Cleveland, O., Oct. 4, 1866.

Raritan, a river of New Jersey, formed by two branches which unitedly flow S. E., and fall into Raritan Bay near Perth Amboy. It is navigable as far as New Brunswick.

R. Armytage. See WATSON, ROSAMUND MARRIOTT.

Ras, an Arabic word signifying "head," prefixed to the names of promontories or capes on the Arabian and African coasts.

Rash, an eruption or efflorescence on the skin, consisting of red patches, diffused irregularly over the body. See NETTLERASH.

Rashi (from the initials of Rabbi Shelomo Izaaki, often erroneously called JARCHI), the greatest Jewish commentator and exegete; born in Troyes, France, about 1040. Philology, philosophy, medicine, astronomy, civil and ecclesiastical law, and exegesis were the chief branches of his learning; and to a rare proficiency in them he united a complete mastery over the whole range of Scripture and the Talmudical sources. In order further to perfect himself for his gigantic task he traveled for seven years, visiting the schools of Italy, Greece, Germany, Palestine, Egypt. His chief work is his "Commentary" on the whole of the Old Testament. Rashi's style is extremely brief and concise, yet clear and pregnant; obscure and abstruse only to those who lack the necessary preliminary knowledge. According to the fashion of its day, it is replete with allegorical or rather poetical illustrations gathered from the wide fields of the Midrash within and without the Talmud. This "Commentary"—entirely translated into Latin by Breithaupt, and partly also into German—was the first book ever printed in Hebrew (Reg-

Rask

gio, 1474). Of his numerous other works may be mentioned his "Commentary on the Babylonian Talmud"; a "Commentary to the Pirke Aboth"; the "Pardes, Treating of Laws and Ceremonies"; a "Collection of Legal Votes and Decisions"; a "Commentary on Midrash Rabbah"; a "Book of Medicine"; and a "Poem on the Unity of God." He died July 13, 1105; and such was his piety and his surpassing eminence that later generations wove a shining garland of legends around his head.

Rask, Rasmus Christian, a Danish philologist; born in Brändekilde, Denmark, Nov. 22, 1787. After he had studied at the University of Copenhagen, he journeyed through Sweden, Russia, and Iceland to increase his knowledge of Northern languages, with the result that he published "An Introduction to the Knowledge of the Icelandic or Old Norse Tongue" (1811); an edition of Haldorsen's "Icelandic Dictionary" (1817); and an "Anglo-Saxon Grammar" (1817). In 1817-1822 he made at the expense of the government, a second journey to Russia, Persia, and India. He then returned to Copenhagen in 1822, was appointed Professor of Literary History and subsequently Professor of Oriental Languages and librarian to the university. During this period he published a "Spanish Grammar," a work on the Frisian language, and a treatise on the Zendavesta, in which he showed that the language was closely akin to Sanskrit. He died in Copenhagen, Nov. 14, 1832.

Raskolniks, the collective name given to the adherents of the dissenting sects in Russia, which have originated by secession from the State Church. The great majority of these sects date originally from the middle of the 17th century, when the liturgical books, etc., were revised under the patriarch Nikon. The Raskolniks clung fanatically to the old and corrupted texts, and regarded the czar and the patriarch as the representatives of Antichrist, called themselves *Staro-obryadtsy* (old ritualists) or *Staro-vertsny* (followers of the old faith). They have split up into a large number of sects, which may be grouped generally in two classes; those who have a priesthood, and those who have none. The tendency of the Raskolniks is communistic; and they have done much to spread Russian influence by advancing colonies on the outskirts of the empire. They have undergone much persecution at the hands of the government, but are now generally unmolested. They include about one-third of the merchant class, and nearly all the Cossacks, but none of the noble or cultivated class. Their numbers are variously estimated at from 3,000,000 to 11,000,000; the last number is perhaps not far from the truth.

Raspberry

Rasp, a coarse file having, instead of chisel-cut teeth, its surface dotted with separate protruding teeth, formed by the indentations of a pointed punch. It is used almost exclusively on comparatively soft substances, as wood, horn, and the softer metals. Also a raspberry.

Raspail, François Vincent, a French chemist; born in Carpentras, France, Jan. 29, 1794. From 1824 till 1830 he contributed many scientific articles, especially on chemistry, to the "Annals of the Natural Sciences," etc., and is by some considered the creator of organic chemistry. Raspail, notorious for his democratic opinions, was wounded in the revolution of July, 1830. Though official employment was offered him, he kept aloof from the government of Louis Philippe, and in the newspaper called the "Friend of the People" proved himself so zealous a republican that he became the object of a series of prosecutions, which, while augmenting his popularity, cost him six years' imprisonment. For one of his disloyal diatribes against the sovereign, he suffered 15 months' imprisonment and a fine. Raspail did not, however, neglect his scientific studies; indeed, several of his works were composed in prison. Two of his works, "Natural History of Health" and "Domestic Medicine and Pharmacy," are remarkable for originality. Having adopted the theory that disease is most frequently confined by internal or external parasites, he fixed on camphor as the best general agent for destroying them, which he prepared and sold at first in the form of cigarettes, afterward using it systematically in other modes, and combining with it other remedies according to circumstances. He took a prominent part in the revolution of 1848; was a member of the Constitutional Assembly, and, again offending was, in 1849, sentenced to five years' imprisonment. Twice during his incarceration he was elected a deputy, but of course could not sit in the chamber. On being liberated, in 1854, he took up his residence in Belgium, in order to devote himself to scientific pursuits. His "Annual of Health" had a large sale. In 1870, Raspail availed himself of the general amnesty, and was elected deputy for Paris. He entered zealously the Commune movement in 1871. Sentenced to two years' imprisonment in 1874 for political "objectionable publications," and in 1876 elected deputy for Marseilles. He died Jan. 8, 1878.

Raspberry, a shrubby plant with many suckers; the prickles of the stem straight and slender, those of the flower shoots curved; the leaves pinnate, three to five foliolate, white and hoary beneath; the flowers drooping, the drupes deciduous. Found in America and in the N. of Europe

Raspe

and Asia. The species in gardens is the wild plant, greatly improved by cultivation. The fruit resembles the strawberry in not



RASPBERRY.

becoming acid in the stomach. There are red and yellow varieties. The plants require shade; the stools need frequent renewal, and suckers should be cut off. Also the fruit of the raspberry. It is used for the manufacture of jam, various liquors, etc.

Raspe, Rudolf Eric. See MÜNCHHAUSEN.

Rassam, Hormuzd, a Turkish Assyriologist; born in Mosul, Mesopotamia, in 1826. He gained the friendship of Layard, and assisted him in his excavations at Nineveh in 1845-1847 and 1849-1851, and then succeeded him, till 1854 as British agent for conducting Assyrian explorations. His grandest success was the finding of the palace of Assurbanipal (Sardanapalus). After holding in the following years political offices at Aden and Muscat, he was sent (1864) by the British government to Abyssinia, to demand the release of the Europeans kept in prison by King Theodore; but that potentate cast him also into prison and only released him with the rest of his captives after his army had been defeated by Sir R. Napier in 1868. From 1876 to 1882 Rassam was employed by the trustees of the British Museum in making explorations in Mesopotamia, and discovered Sepharvaim (Sippara) and Kuthah. He published "The British Mission to Theodore, King of Abyssinia." He died in 1910.

Rasse, a carnivorous quadruped, closely allied to the civet, spread over a great extent of Asia, including Java, various parts of India, Singapore, Nepâl, and other localities. Its perfume, which is secreted in a double pouch like that of the civet, is much

Rat

valued by the Javanese. For its sake the animal is often kept in captivity. It is savage and irritable, and can inflict a very severe bite.

Rassieur, Leo, an American lawyer; born in Wadern, Prussia, April 19, 1844; came to the United States in early childhood. At the outbreak of the Civil War he volunteered as a private in the Union army, rising to the rank of major in 1865. He was admitted to the St. Louis bar in 1867, and after holding office in connection with the public schools was elected judge of the Probate Court on Jan. 1, 1899. He was elected commander-in-chief of the Grand Army of the Republic, Aug. 20, 1900.

Rastatt, or Rastadt, a town and first-class fortress in Baden; on the Murg, 3 miles from its junction with the Rhine, and 15 miles S. W. of Karlsruhe. Steel wares, beer, and tobacco are manufactured. From 1725 to 1771 the town was the residence of the Margraves of Baden-Baden. The present fortifications were erected in 1840-1848 by Austrian engineers to protect the N. entrance to the Black Forest. Rastatt is memorable for two congresses—the first in 1714, when a treaty of peace, which brought the war of the Spanish Succession to a close, was signed between Marshal Villars and Prince Eugene; and the second in 1797-1799. On the breaking up of this latter congress without any definite result the three French plenipotentiaries set out for Strasburg; but they had scarcely got beyond the gates of Rastatt when they were attacked by Austrian hussars, and two of the three slain, while the third was left for dead in a ditch. Their papers were carried off, but no further spoil was taken. It seems that the Archduke Charles gave orders to the hussars to drive the French representatives out of Rastatt and take away their papers; the killing was the work of the officers, misunderstanding their orders. The town played a prominent part in 1849 as the stronghold of the revolutionists in Baden. Pop. (1905) 14,404.

Rastrites, in palæontology, a genus of Graptolites or Rhabdophora. The polypary consists of a slender axial tube, having on one side a row of cellules, or hydrothecæ, separate and not overlapping. The typical species is *R. peregrinus*, which, with *R. triangulatus*, is found in the S. of Scotland. Etheridge makes a zone of *R. peregrinus* in the Upper Birkhill or Gray Shale group of the Lower Llandovery. Found also in Bohemia (where it is said to extend to the Upper Silurian), in Saxony, etc.

Rat, in zoölogy, a name popularly applied to the larger murines, but more strictly applicable to two species (1) The English black rat (*Mus rattus*), and the

Rata

brown, or Norway rat (*M. decumanus*). The former is a small, lightly-built animal, about seven inches long, with a slender head, large ears, and a thin scaly tail, longer than the body. In temperate climates the color is a bluish-black lighter on the belly. This species is represented in warmer climates by the Alexandrian rat (*M. alexandrinus*, better known as *M. rattus rufescens*), with a gray or reddish back, and white under-surface. By later naturalists it is considered as only a variety. The albino and pied rats, kept as pets, also belong to this species, which had its home in India, and penetrated thence to almost every part of the world, driving out the native rats, and to be, in its turn exterminated by the brown rat (probably a native of China, where a similar species, *M. humiliatus*, is still found). The brown rat is much more heavily built than



BLACK RAT.

the black rat, grayish-brown above and white beneath; ears, feet, and tail flesh-colored. Melanism often occurs, but such animals may be readily distinguished by ordinary specific differences from the true black rat. Length of head and body eight or nine inches long, tail shorter. Both the species are omnivorous, predaceous, and extremely fecund, breeding four or five times in the year, the female producing from 4 to 10 blind, naked young, which breed in their turn at about six months old, *M. fuscipes* is the brown-footed rat of Australia; *Nesokia bandicota*, the bandicoot, or pig rat; and *N. bengalensis*, the Indian field rat. Figuratively: (1) One who deserts his party (especially in politics), as rats are said to forsake a falling house or a doomed ship. (2) A workman who takes work for less than the regular wages current in the trade; also a workman who takes employment at an establishment where the regular hands have struck; a term of opprobrium applied to non-union men by members of trades unions; specifically to non-union printers.

Rata (*Metrosideros robusta*), a New Zealand tree related to various species of ironwood. The seed is believed to be swal-

Ratel

lowed by a caterpillar, and to sprout in its interior, the fostering grub being of course killed. The tree begins life as a climber, attached to other forest trees, and attains a height of 150 feet; but when it has killed the supporting stem the rata is able to sustain its own weight and to grow on as an independent tree, attaining ultimately a height of nearly 200 feet. The wood is very hard, formerly much used for making clubs, and is valuable for shipbuilding.

Ratafia, a spirituous liquor flavored with the kernels of several kinds of fruit, as cherries, apricots, peaches, etc., and sweetened with sugar. Applied to the liquors called noyau, curaçoa, etc.

Ratany (*Krameria triandra*), a shrubby plant found in Peru and Bolivia, having an excessively astringent root. It is sometimes used as an astringent medicine in passing bloody or mucous discharges, weakness of the digestive organs, and even in putrid fevers. It has silver-grey foliage and pretty red starlike flowers. Written also rhatany.

Ratchet, in machinery, the detent which prevents the backward motion of a RACKET WHEEL (*q. v.*).

Ratchet Wheel, a wheel having inclined teeth for receiving a ratchet or detent, by which motion is imparted or arrested. The teeth are of such shape as to revolve and pass the detent in one direction only. The detent may be a pallet or a pawl. The former receives an intermittent rotation by a reciprocating circular movement of the arbor and its cam. Sometimes the wheel is intermittingly rotated by the motion of one pawl, while the other one acts as a detent in the intervals between the forward motions of the former.

Ratchet Wrench, a wrench operated by a ratchet and pawl, so that it may be turned continuously without removal from the bolt or nut to which it is applied, by a backward and forward movement of the handle.

Ratchment, in architecture, a kind of flying buttress which springs from the principals of a herse, and meets against the central or chief principal.

Ratel, the genus *Mellivora*. Two species are usually distinguished, *M. indica*, the Indian, and *M. ratel*, the Cape ratel; some authors give specific distinction to the West African race, as *M. leuconota*. The body is stout and heavily built, legs short and strong, with long curved fossorial claws, tail short, ear-conches rudimentary. General coloration iron-gray on the upper, and black on the lower surface, reversing the general plan of coloration, which is generally lighter on the under surface. A marked white stripe divides the gray of the

upper parts from the black in the Cape ratel, which is said to live principally on honey. Jerdon says that *M. indica*, which he calls the Indian badger, is found throughout India, living usually in pairs,



THE CAPE RATEL.

and eating rats, birds, frogs, white ants, and various insects; and in the N. of India, where it is accused of digging out dead bodies, it is popularly known as the grave-digger. It doubtless also, like its Cape congener, occasionally partakes of honey and is often very destructive to poultry. In confinement it is quiet, and will eat fruits, rice, etc.

Rathenow, a town of Prussia, on the right bank of the Havel (here crossed by a stone bridge), 43 miles W. by N. of Berlin. Optical instruments, wooden wares, machinery, bricks and tiles, are made. Pop. (1890) 16,353.

Rathlin, a crescent-shaped island off the coast of Antrim, $6\frac{1}{2}$ miles N. of Ballycastle. Measuring $6\frac{1}{2}$ by $1\frac{1}{2}$ miles, and 3,398 acres in area, it has fine cliffs, consists of columnar basalt and limestone, and attains a maximum altitude of 449 feet. The soil in the valleys is fertile, but fishing is the leading industry, the kelp-manufacture being quite extinct. Rathlin is identified with the Ricinia of Ptolemy, Ricnia of Pliny, and Raghlin or Ragherin ("fortress of Ireland") of later writers. St. Columba established a church here in the 6th century; and Bruce in 1306 took refuge in a castle, now a ruin. Pop. (1901) 368.

Ratibor, a town of Prussian Silesia; on the left bank of the Oder, 44 miles S. S. E. of Oppeln. It is the chief town of the principality of Ratibor, which, a sovereign duchy from 1288 to 1532, has since 1742 been subject to Prussia. The town manufactures tobacco, shoes, paper, glass, sugar, furniture, etc., and has large ironworks. Pop. (1900) 25,256.

Ratification, in law, the confirmation, sanction or approval given by a person who has arrived at his majority to acts done

by him during his minority. It has the effect of giving validity to such acts as would be otherwise voidable. Ratification by a wife, in Scotch law, a declaration on oath made by a wife before a justice of the peace (her husband being absent) that the deed she has executed has been made freely, and that she has not been induced to make it by her husband through force or fear.

Ratio, in law, an account; a cause, or the giving judgment therein. In mathematics: (1) The measure of the relation which one quantity bears to another of the same kind; that is, it is the number of times that one quantity contains another regarded as a standard. This is found by dividing the one by the other. The quotient or ratio thus obtained is the proper measure of the relation of the two quantities. Some writers define the ratio of one quantity to another as the quotient of the first quantity divided by the second, while others define it as the quotient of the second divided by the first. Thus, the ratio of 2 to 4, or of a to b , may be taken either as $2 \div 4$ or $4 \div 2$, and $a \div b$ or $b \div a$. In every ratio there are two quantities compared, one of which is supposed known, and is assumed as a standard; the other is to be determined in terms of this standard. These quantities are called terms of the ratio; the first one, or that which is antecedently known, is called the antecedent, and that whose value is to be measured by the antecedent, is called the consequent. Ratios are compared by comparing the fractions; thus, the ratio of 8:5 is compared with the ratio of 9:6, by comparing the fractions $\frac{8}{5}$ and $\frac{9}{6}$; these fractions are respectively equal to $\frac{48}{30}$ and $\frac{45}{30}$, and since $\frac{48}{30}$ is greater than $\frac{45}{30}$, the ratio of 8:5 is greater than that of 9:6. Ratios are compounded together by multiplying their antecedents together for a new antecedent, and their consequents together for a new consequent; thus, the ratio of $a:b$, compounded with that of $c:d$, is $ac:bd$. Proportion is the relation of equality subsisting between two ratios. See PROPORTION. (2) A name sometimes given to the rule of three in arithmetic.

Compound ratio: (a) The ratio of the product of the antecedents of two or more ratios to the product of the consequents: thus if $3 : 6 :: 4 : 12$, then 12:72 is the compound ratio. (b) When one quantity is connected with two others in such a manner that if the first is increased or diminished, the product of the other two is increased or diminished in the same proportion, then the first quantity is said to be in the compound ratio of the other two.

Direct ratio, two quantities are said to be in direct ratio when they both increase or decrease together, and in such a manner that their ratio is constant.

Ratio

Duplicate ratio, when three quantities are in continued proportion, the first is said to have to the third the duplicate ratio of that which it has to the second, or the first is to the third as the square of the first to the square of the second.

Inverse ratio, two quantities or magnitudes are said to be in inverse ratio, when if the one increases the other necessarily decreases, and, *vice versâ*, when the one decreases the other increases.

Mixed ratio or proportion: a ratio or proportion in which the sum of the antecedent and consequent is compared with the difference of the antecedent and consequent: Thus, if $a:b::c:d$, then $a+b:a-b::c+d:c-d$ is the mixed ratio or proportion.

Prime and ultimate ratios, a method of analysis, devised and first successfully employed by Newton in his "Principia." It is an extension and simplification of the method known among the ancients as the method of exhaustions. To conceive the idea of this method, let us suppose two variable quantities constantly approaching each other in value, so that their ratio continually approaches 1, and at last differs from 1 by less than any assignable quantity; then is the ultimate ratio of the two quantities equal to 1. In general when two variable quantities simultaneously approach two other quantities, which, under the same circumstances, remain fixed in value, the ultimate ratio of the variable quantities is the same as the ratio of the quantities whose values remain fixed. They are called prime or ultimate ratios, according as the ratio of the variable quantities is receding from or approaching to the ratio of the limits. This method of analysis is generally called the method of limits.

Extreme and mean ratio, in geometry, the ratio where a line is divided in such a manner that the greater segment is a mean proportional between the whole line and the lesser segment: that is, that the whole line is to the greater segment, as that greater segment is to the less.

Composition of ratios, the act of compounding ratios.

Ratio of a geometrical progression, the constant quantity by which each term is multiplied to produce the succeeding one. To find the ratio of a given progression, divide any term by the preceding one.

Ratio of exchange, a phrase used in political economy to denote the proportion in which a quantity of one commodity exchanges for a given quantity of another. The expression can never be used with any degree of accuracy, except in those cases where the commodities are homogeneous in quality, and susceptible of weight or measurement, as in the exchange of gold for silver, copper, iron, etc., or that of wheat for barley, oats, etc.

Rationalism

Ration, a stated or fixed amount or quantity dealt out; an allowance. Specifically, rations are the allowance of provisions given out to each officer, non-commissioned officer, soldier, or sailor.

Rationalism, as a "system of belief regulated by reason," might be expected to mean the opposite of irrationality, crass ignorance, and perverse prejudice; and the rationalism would then mean the progress of civilization, the development of the intellectual and moral nature of men and nations. It is nearly in this sense that Lecky uses the word; attributing to its wholesome influence the decay of the belief in magic, witchcraft, and other hideous superstitions, and the substitution of a kindly tolerance in place of blind zeal for persecution.

But in ordinary English usage, general as well as theological, the connotation of the word is substantially different. It is generally employed as a term of reproach for those who, without utterly denying or attempting to overthrow the foundations of religion, make such concessions to the enemy as tend to subvert the faith; who admit the thin end of a wedge that pressed home will rend and destroy the fabric. They rely, more or less exclusively and blameworthy, on mere human reason instead of simply, frankly, and fully accepting the dicta of the divine word. An atheist would not be spoken of as a rationalist, nor would an irreligious, blaspheming freethinker. Rationalists in ordinary parlance are those who are more "liberal" or "advanced" than the main body of the orthodox; in especial those who take a "low" view of inspiration, and minimize or explain away the miraculous details of the history of revelation and redemption. Rationalism is not so much a body of doctrine as a mood of mind, a tendency of thought shown in the attempt to apply to religious doctrine, the sacred story, and the sacred Scriptures the same methods of research and proof as are used in mere human science and history, and the literatures of all times and peoples. This feature is also recognized, though with approval, by Lecky in his wider use of the word: "Rationalism," he says, "leads men on all occasions to subordinate dogmatic theology to the dictates of reason and conscience. . . . It predisposes men in history to attribute all kinds of phenomena to natural rather than to miraculous causes; in theology to esteem succeeding religious systems the expression of the wants and aspirations of that religious sentiment which is implanted in man; and in ethics to regard as duties only those which conscience reveals to be such." Rationalism, not being a system but a temper or drift of mind, has different aims at different times; just as "liberalism" in politics was not the same thing before 1832 as it

came to be after, or in 1832 what it was in 1867, 1885, or 1900. Opinions are heard in sermons and expounded in books by theological professors in 1902 without proving serious stumbling blocks to the majority, which in 1860 would by all but a small minority have been regarded as distinctly rationalistic. Thus, till lately it was alarming rationalism to dispute the Mosaic authorship of Genesis, the Solomonic authorship of the Song of Songs, and the Davidic authorship of any of the Psalms, now the newer view is assumed by many orthodox teachers. And in the last quarter of the 19th century scholars earnestly supported views which they themselves treated as highly dangerous 20 or 30 years earlier. Rationalism of this kind is a transition stage, but not necessarily a transition to unbelief.

The rationalistic temper may be traced in almost every age of the Church's history; no doubt the extremer representatives of the Petrine party in sub-apostolic times regarded Paul's views as lax and rationalistic. If the Reformation was not rooted in rationalism (as to Catholics it seems to have been), many of the contentions of the reformers were such as all rationalists accept and sympathize with. Zwingli was a rationalist to Luther and the Lutherans; Socinus was of course a rationalist of an extreme type. The dry and barren dogmatic orthodoxy of Germany in the 17th century fostered a rationalism as cold and unspiritual. In the England of the 18th century, during the deistic controversies, the Evangelicals of Germany thought, not altogether unjustly, that some of the most conspicuous opponents of the deists were not themselves free from the charge of rationalism; and the Evangelicals of Scotland regarded the "moderates" of the 18th century, however orthodox in dogma, as thoroughly rationalistic in spirit. Rationalism is not so much opposed to orthodoxy as to the mysticism, and what was called variously fanaticism, enthusiasm, "high-flying," and methodism. A soulless orthodoxy has not seldom been opposed by a fervent piety that by a not unnatural antithesis has tended to run into heretical extremes; while, on the other hand, actual rationalists have often been foremost among the champions of religion, and of revealed religion, against radical freethinking, deism, naturalism, and materialism.

In Germany the term rationalism is more definite in its reference than in England, but is not always used in quite the same sense. The two defective and mutually opposed schools of thought that Kant sought to supersede by his critical philosophy were, on the one hand, a shallow empiricism, and on the other a baseless and overweening metaphysical dogmatism or ra-

tionalism. Bacon also contrasted empirical philosophers with rationalists who spin their systems as spiders do cobwebs out of their own bowels. Wolff presents the most conspicuous example of the philosophical rationalism which held that all that is in heaven above and earth beneath could be "proved" by pseudo-mathematical methods; and as God, responsibility, and immortality were among the things that could be proved at endless length and in various ways, this philosophical rationalism led directly up to a rationalist theology, which consisted mainly in a series of dogmas to be demonstrated from the philosophical axioms, including some at least of the doctrines of revealed religion. What in revelation could not be demonstrated according to this scheme was disallowed or explained away. Practical religion became in the *Aufklärung*, a system of mere utilitarian morals.

Kant prepared the way for a deeper view of man, history, and the universe; but his own explicit statements on positive religion were pronouncedly rationalistic; and the negative side of his philosophy was well calculated to lay the foundations of another school of theological rationalists (often called vulgar rationalism), of whom Tieftrunk (died 1837), Bretschneider (1776-1848), and Wegscheider (1771-1849) may be taken as representatives. De Wette (1780-1849) shows the transition to Schleiermacher, who (though in the English sense of the word he was an outspoken rationalist) combined what was best in the opposing schools of rationalists and supernaturalists, founded a higher and truer religious philosophy, and heralded even the "pectoral theology" of the mediation school.

But it was not in the sphere of speculation and dogma, but in that of Biblical criticism, that German rationalism accomplished its main work, and left its deepest mark on subsequent theological development. In the early 18th century the "Germans in Greek were sadly to seek," as English scholars thought; Germans themselves admitted that in studying the Scriptures they failed to escape from dogmatic presuppositions, and that it was the English divines who approached the New Testament in a historical spirit, which in the Germany of that day caused misgivings. It is noteworthy that Semler (1725-1791), "the father of rationalism," obtained the doctorate for a thesis written against Whiston, Bentley, and other English scholars in defense of the "three heavenly witnesses" of I John, v: 7. Semler in the schools, supported by Lessing and Herder in literature, was soon teaching that the books of the Bible must be studied as human productions: Eichhorn (1752-1827)

Ratisbon

thoroughly accepted and applied that principle. Rationalist criticism was carried to an absurd length by Paulus (1861-1851), who taught that the Gospels contained natural and not supernatural events, and whose most ingenious but inept "explanations" of the miracles of the New Testament, "retaining everywhere the husk but surrendering the religious kernel," were made a laughing stock by Strauss. Strauss's "mythical theory" (excessively rationalist in the English sense of the term) was in its turn superseded by Baur, and the new Tübingen school, whose epoch-making work marks the opening of the most recent period in Scriptural criticism. The "notes" of the newer criticism, whether more or less rationalist from the older English point of view, are the conviction that all truth is one, whether derived from the natural sciences, historical research, the dictates of conscience, or the records of divine revelation, and the willingness to accept what is apparently established by the consensus of scholars even where this involves giving up the belief in the inerrancy of Scripture. Many of the contentions of self-confident and aggressive rationalism have long since mutually destroyed one another. Nothing can be more contrary to the true historic and scientific spirit than the assumptions of a reckless sciolism: there is a false and a true rationalism; and it should be remembered that much that is now most surely believed by all has at one time or another been branded as rationalistic.

Ratisbon (German Regensburg), a city of Bavaria, on the Danube, opposite the influx of the Regen, 67 miles from Regen. Though built of stone, it has all the defects of an old town, the streets being narrow and crooked, and the houses high and old-fashioned. The town house is gloomy. The best edifices are the cathedral, and the palace of the Prince of Thürn and Taxis, formerly the abbey of St. Emmeran, containing many good paintings; the town house, in which the diet of the empire was held from 1662 to 1806; the episcopal residence, the arsenal, and the Haidplatz, where tournaments were given in the days of chivalry. Besides these, there are a public drawing school, public libraries, an observatory, gymnasium, and several hospitals. Manufactures tobacco, porcelain, leather, and steel wares; also extensive dockyards for the building of boats and lighters. There is also a considerable trade on the Danube. The river is crossed by a bridge of great length, connecting Ratisbon with its N. suburb, called Stadt-am-Hof. This place was long the capital of Bavaria. In 1524 the Roman Catholics here formed a league against the Protestants; and here, in 1809, Napoleon I. was wounded in a battle in

Rattazzi

which he forced the Austrians to retreat. Ratisbon was made a free port in 1853. Pop. (1905) 48,801.

Ratitæ, a division of birds, introduced by Merrem in his "Attempt at a Natural System of Birds," and containing his genus *Struthio*, since divided. They are all incapable of flight; though some run very swiftly, the abnormally small wings acting as a kind of sail, and helping the birds along. They may be divided into two groups: (1) Those in which the wing has a rudimentary or very short humerus, and not more than one ungual phalanx (the *casuariidæ*, the fast-vanishing *Apterygidæ*), and the extinct *Dinornithidæ*, often treated as one family (*Apterygidæ*); and (2) those having a long humerus and two ungual phalanges (*Rheidæ* and *Struthionidæ*, often combined under the latter name).

Rat Snake, *Ptyas mucosus*, a powerful snake, attaining a length of seven feet and upward. Common in India and Ceylon, scarce in the Archipelago. It frequently enters houses in search of mice, rats, and young fowls. It is fierce, and always ready to bite. When irritated it is said to utter a peculiar diminuendo sound. The name is sometimes applied to the genus *Spilotes*.

Rattan, the commercial name for the stem of various species of the genus *Calamus*. They abound in Southern Asia in moist situations, and are used for making splints for chair seats and backs, hanks for sails; cables, sometimes as much as 42 inches round; cords, withes, and walking sticks; also for making splints for baskets and brooms, fish weirs, hurdles, hoops, carriage seats, and many other purposes. The larger species grow to a size of three inches diameter, and to a height of 100 feet. The great rattan is *C. rudentum*; the ground rattan, *Rhaphis flabelliformis*. Also a cane or walking-stick formed of a rattan.

Rattany. See RHATANY.

Rattazzi, Marie Studolmine de Solms, a French novelist; born in London, England, (or in Waterford, Ireland), in 1830; daughter of Sir Thomas Wyse, British ambassador to Greece, and Letitia, eldest daughter of Lucien Bonaparte; married Urbano Rattazzi in 1863, and M. de Rute in 1877. Among her many novels, "The Mariages of the Creole" and "If I Were Queen" are the most popular. She edited several journals, and has written a number of poems and dramas, all under the name of "Princess Marie de Solms." She died in Paris, in February, 1902.

Rattazzi, Urbano, an Italian statesman; born in Alessandria, Italy, June 29, 1808. He studied law at Turin and practised as an advocate with great success at Casale. After the proclamation of the con-

stitution in 1848 he was elected member of the Second Chamber for Alessandria, and began his political career as a democrat. His eloquence and liberal principles raised him to the ministry: Gioberti made him minister of the interior and later of justice; but after the defeat of Novara he was obliged to retire with the rest of the ministry. When Napoleon III. threatened the liberty of Piedmont, Cavour, Rattazzi, and their parties joined together to defeat his schemes, and in 1853 Rattazzi took the portfolio of Justice under Cavour, and presented the bill for the abolition of convents. Being accused of weakness in suppressing the Mazzinian movement in 1857, he retired from office early in the following year. In 1859, however, he was back again in office as Minister of the Interior. The threatened cession of Savoy and Nice, which he opposed, led to his retirement in 1860. Hav-



RATTLESNAKE.

ing changed his views on this point, he was in March, 1862, intrusted with the formation of a new ministry, but had to resign at the end of the year in consequence of his opposition to Garibaldi; and once more prime minister for six months in 1867, he lost the post for the same reason. He died in Frosinone, June 5, 1873.

Rattlesnake, the English name for any species of the American genus *Crotalus*, the tail of which is furnished with a rattle. Garman enumerates 12 species and 13 varieties, falling into two groups: (1) Having the upper side of the head covered with nine dermal shields; (2) having the shields behind the eyes broken up or replaced by small scales. The second group comprises the more formidable kinds, generally described as *C. horridus* and *C. durissus*. The first name was formerly applied to the reptile extending from Paraguay and Chile through Brazil, into Mexico, and the latter to the North American rattlesnake. In recent American works this nomenclature is reversed. The poison of the rattlesnake is usually fatal to man, though fortunately they are sluggish, and never attempt to strike unless they are molested. They are widely distributed on the American conti-

ment; but advancing cultivation is rapidly thinning their numbers, and the half-wild hogs of the settlers, peccaries, and deer contribute materially to this result. They are far from uniform in coloration: often the ground-color is brownish, sometimes yellow or blackish, with dark spots, frequently bordered with yellow, on the back and sides; head and neck ornamented with dark or black longitudinal bands, or of almost uniform coloration.

Rattlesnake Root, a name for *Polygala Senega*, an American plant used to cure the bite of the rattlesnake.

Rattlesnake Weed, the American plant *Eryngium virginicum*, used as a cure for the bite of the rattlesnake.

Rauch, Christian, a German sculptor; born in Arolsen, Waldeck, Germany, Jan. 2, 1777. He received some instructions from the sculptor Ruhl, at Cassel, afterward proceeded to Berlin to act as one of the royal lackeys, modelled a bust of the queen, and in 1804 went to Rome, where he made the acquaintance of Thorwaldsen and Canova, and obtained the patronage of Wilhelm von Humboldt. He received an invitation in 1811 from the King of Persia to design a monument of Queen Louisa, and produced a noble work which established the fame of the artist. From this time onward he was the sculptor of an immense number of works in all the branches of the statuary art. He was especially great in ideal figures and in portraiture. Among his masterpieces may be mentioned the monument of King Frederick, William III. and Queen Louisa in the Charlottenburg mausoleum, the colossal equestrian statue of Frederick the Great at Berlin, having the base surrounded by groups of his most distinguished contemporaries, and forming altogether one of the most notable monuments in Europe; the six colossal figures of Victory in the Walhalla, and a group representing Moses with his hands supported by Aaron and Hur. He died in Dresden, Dec. 3, 1857.

Rauhes Haus, ("the Rough House") the name of an institution founded and managed by Johann Heinrich Wichern (1808-1881) at Horn, near Hamburg, in connection with the German Home Mission. It is partly a refuge for morally neglected children; partly a boarding school for the moral and intellectual education of children of the higher classes; lastly, a training school for those who wish to become teachers or officials in houses of correction, hospitals, etc., in promotion of the objects of the Home Mission. It was opened Nov. 1, 1831, by Wichern with 12 neglected children. By the addition of new houses the whole has, however, been very much enlarged, and has almost grown into a colony. A printing office, a bookbinders' shop, and

Raum

book selling form part of the institution. The children live in families of 12, each family being under the paternal superintendence of a young artisan, who employs the children according to their capabilities, partly in indoor, partly in outdoor manual labor. In connection with the Rauhes Haus there was founded in 1845 a kind of conventual institute for the education of young men as heads or superintendents of similar institutions.

Raum, Green Berry, an American lawyer; born in Golconda, Ill., Dec. 3, 1829; studied law, and was admitted to the bar (1853). Three years later he took his family to Kansas. It was in the midst of the great struggle for freedom, and his influence was at once thrown on the side of the Free State party. When the war broke out he enlisted, and was appointed major in the 56th Illinois regiment. In the campaign of 1862 he served under Rosecrans in Mississippi, and at the battle of Corinth he distinguished himself by leading an effective charge. He was with Grant during the siege of Vicksburg, was wounded at Mission Ridge, and when he finally resigned his commission he had risen from major to Brigadier-General. In 1866 he was elected to Congress; was Commissioner of Internal Revenue in 1876-1883; United States Commissioner of Pensions in 1889-1893. He wrote: "The Existing Conflict" (1884); and "History of Illinois Republicanism" (1900). He died Dec. 18, 1909.

Raumer, Friedrich Ludwig Georg von, a German historian; born in Wörlitz, near Dessau, Anhalt, May 14, 1781. He studied law at Halle and Göttingen, and entered the Prussian state service in 1801. In 1811 he accepted the chair of history and politics at Breslau; in 1819 he was called to fill the similar chair at Berlin. He was for some time secretary of the Berlin Academy. In 1848 he was sent to Paris as ambassador of the German Parliament. The first scientific historian to popularize history in German, Von Raumer wrote "History of the Hohenstaufen" (1823-1825), his best book, based on critical research, and agreeably written; "History of Europe Since the End of the Fifteenth Century" (1832-1850); "Modern History" (1836-1839); and edited the useful "Historical Pocketbook" from 1830. In the years 1830-1843 he made extensive journeys, going as far as the United States; the observations made during these trips were written in several books dealing with England (1835 and 1841), Italy (1840), the United States (1845), etc. He died in Berlin, Prussia, June 14, 1873.

Raumer, Karl Georg von, a German geologist and geographer, a brother of the preceding; born in Wörlitz, Germany, April

Raupach

9, 1783; studied at Göttingen and Halle, and at the Mining Academy at Freiberg; was appointed Professor of Mineralogy at Breslau in 1811; translated in 1819 to Halle; and finally, in 1827, appointed Professor of Mineralogy and Natural History at Erlangen. His most ambitious book was "History of Pedagogy" (1843-1851; 5th ed. 1878-1880), a portion of which was issued separately as "The Education of Girls" (4th ed. 1886). His most popular books were, after these, "Description of the Surface of the Earth" (6th ed. 1866); "Palestine" (4th ed. 1860); and "General Geography" (1832; 3d ed. 1848). He also wrote books more immediately connected with his special study, as "Geognostic Fragments" (1811); "Primer of Crystallography" (1820-1821); etc. His son **RUDOLPH VON RAUMER** (1815-1876), from 1846 a professor at Erlangen, won a high reputation in the field of Teutonic philology. He died in Erlangen, June 2, 1865.



THE GOD RAVANA.

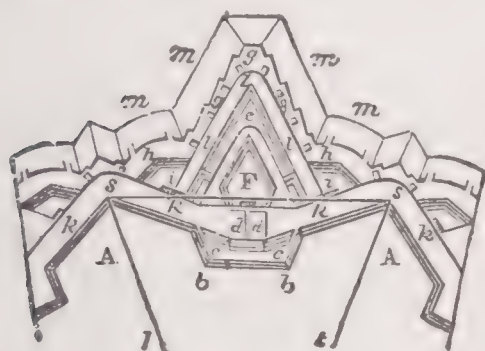
Raupach, Ernst Benjamin Salomo, a German dramatist; born in Straupitz, Silesia, May 21, 1784. He was popular in his day, and has many admirers still. His leading plays include: "The Princess Chawansky" (1818); "The Enchained" (1821); "The Magic Ring of Love" (1824); "The Friends" (1825); "Isidor and Olga" (1826); "Raphael" (1828); and "The Daughter of the Air" (1829). His comedies were very successful — among others, "Critic and Anti-Critic," "The Smugglers," and "The Spirit of the Time." He died in Berlin, Prussia, March 18, 1852.

Ravaillac

Ravaillac, François, a bankrupt schoolmaster; born in 1578; who, after long imprisonment and a brief service in the Order of Feuillans, was moved by fanaticism to stab HENRY IV. (*q. v.*) of France. He was torn asunder by horses in 1610.

Ravana, in the Hindu religious system, the name of the Rākshasa who, at the time of Râma, ruled over Lankâ or Ceylon, and having carried off Sîtâ, the wife of Râma, to his residence, was ultimately conquered and slain by the latter. He is described as having been a giant with 10 faces, and in consequence of austerities and devotion, as having obtained from Siva a promise which bestowed on him unlimited power, even over the gods. As the promise of Siva could not be revoked, Vishnu evaded its efficacy in becoming incarnate as Râma, and hence killed the demon giant.

Ravelin, in fortification a detached work having a parapet and ditch forming a salient angle in front of the curtain. It is



RAVELIN.

A, A, bastions; b, b, curtain; c, c, tenailles; d, d, caponniere; e, e, ravelin; F, redoubt in the ravelin; g, g, covert-way; h, h, reëntering places of arms; i, i, redoubts in do.; k, k, ditch; l, l, ditch of ravelin; m, m, m, m, glacis; s, s, exterior side; s, t, capital.

erected on the counterscarp, and receives flank defense from the body of the place. Inside the ravelin may be a redoubt and ditch; the gorge is unprotected, and the ravelin may be considered a redan on the counterscarp.

Raven, the genus *Corvus*, and especially

C. corax, one of the largest of the Passerines. It is about 26 inches long, plumage black, glossed with steel-blue and purple; very widely distributed in the Northern Hemisphere. The raven has played an important part in mythology and folk-lore. It is the first bird mentioned by name in the Old Testament (Gen. viii: 7); by the ministry of ravens Elijah was fed (I Kings xvii: 6), and they were to be the ministers of vengeance on unruly children (Prov. xxx: 17). The raven was the bird of Odin, and in classic mythology was of ill-omen, a character often attributed to it by the early English dramatists. Marlowe calls it the "sad presageful raven," and Shakespeare repeatedly refers to the belief that its appearance foreboded misfortune. This belief, which is widespread, probably arose from the preternaturally grave manner of the bird, its sable plumage, and the readiness with which it learns to imitate human speech.

Ravenna

Ravenala, or **Ravinala**, a genus of *Uranææ*. The *U. speciosa* is a fine banana-like tree with edible seeds, from Madagascar, where the French call it the traveler's tree, perhaps because water is found in the cup-like sheaths of the leaf-stalks.



RAVEN: CORVUS CORAX.

Ravenna, an important city of Central Italy, 43 miles E. S. E. of Bologna, and 4½ miles from the Adriatic. It is situated in the midst of a well-watered, fertile, and finely wooded plain, and is surrounded by old bastions, and by walls where may still be seen the iron rings to which the cables of ships were formerly fastened; the sea is now at the distance of about 4 miles from the city. The streets are wide; the squares are adorned with the statues of the Popes, and the houses have a gloomy appearance. It is an ancient city, rich in monuments of art. The cathedral, built in the 4th century, was almost wholly rebuilt in 1734; it has five naves, supported by 24 marble pillars. Of the other 14 churches and other architectural antiquities several date from the 5th and 6th centuries. San Francesco possesses the tomb of Dante, erected in the 15th century. The library of Ravenna contains 50,000 volumes. It has an archæological museum, and many educational institutions. Ravenna has manufactures of silk, and its trade is facilitated by a canal to the sea. The city was probably of Umbrian origin; it was at least an Umbrian city when it passed into the hands of the Romans. Augustus made it a first-class seaport and naval station; 400 years later the Emperor Honorius took refuge there, and made it the capital of the empire. The city was taken by Odoacer, then by Theodoric and by Totila; the latter was conquered by Narses, who made it the residence of the exarchs in 553. In 1218 it became a republic. In 1275 Guido da Polenta conquered it, and there established his court, where he received Dante. Ra-

venna was afterward taken by the Venetians, who kept it till 1509. Under Charles V. it passed into the hands of the Popes. Under its walls a great battle was fought in 1512 between the French and the Spaniards, in which Gaston de Foix purchased victory with his life. Pop. (1901) 64,031.

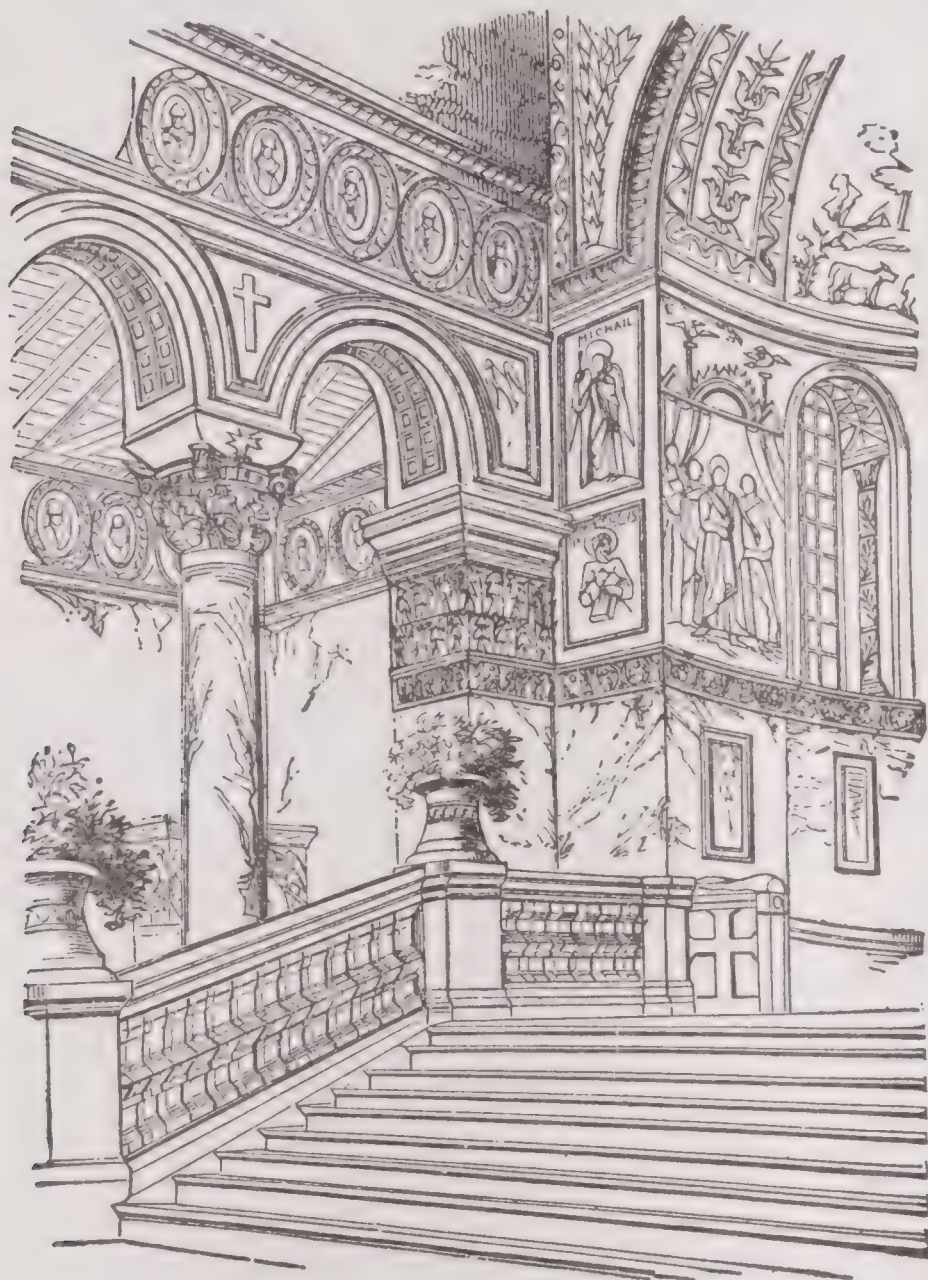
In 1611 he published a collection of 23 part-songs, under the title of "Melismata"; in 1614 appeared another collection of part-songs, prefixed by an essay; and in 1621 he published his "Whole Book of Psalms," containing a tune for each of the 150 psalms, harmonized in four parts by all the great musicians of the period. He died in 1640.

Ravignan, Gustav François Xavier Delacroix de, a French Jesuit preacher; born in Bayonne, France, Dec. 2, 1795; was professor at Montrouge, and became famous in 1837 as preacher at Notre Dame in Paris. He published an Apology of his order in 1844, and in 1854 a more lengthened work with the same view, "Clement XIII. and Clement XIV." He died Feb. 26, 1858.

Ravogli, Augustus, an American surgeon; born in Rome, Italy, Feb. 7, 1851; was graduated at the Medical Department of the University of Rome, Italy, in 1873; was appointed surgeon of the local hospitals in 1874; was sent abroad by the Italian government to study at the universities of Vienna, Prague, and Berlin in 1876; served as surgeon in the military hospital of the Italian army with the rank of major for several years. In 1880 he came to the United States and in the following year settled in Cincinnati, O.; was afterward made Professor of Dermatology and Syphilography at the Medical Department of the University of Cincinnati. He was a member of the Ohio State Board of Medical Registration and Examination

for several years. His publications include "The Hygiene of the Skin" (1888) and numerous articles in American medical journals.

Raw, Charles, an American archæologist; born in Vervien, Belgium, in 1826; was educated in Germany, and settled in the United States in 1848. He was engaged in teaching in the West and in New York city till 1875, when he was made curator of the Department of Antiquities in the United States Museum in Washington, D. C. About this time he began to devote himself to the study of American archæology, in which he became an eminent authority. He was identified with the chief archæological and anthropological organizations of the United States and Europe. His publications include "Early Man in Europe" (1876); "The Archæological Collection of



RAVENNA: ENTRANCE TO APSIS OF ST. APOLLINARUS CHURCH.

Ravenscroft, Edward, an English dramatist who flourished between 1671 and 1697. He was exceedingly popular in his day. His first play was "Mamamouchi; or, The Citizen Turned Gentleman" (1675), and was taken from Molière's "The Gentleman Citizen." His numerous comedies, farces, and tragedies, some posthumous, include "The Wrangling Lovers" (1676); "Scaramouch, a Philosopher" (1677); "King Edgar and Alfreda" (1677); "Ignoramus" (1678); "The London Cuckolds" (first published in 1783); "Dame Dobson" (1683); "The Canterbury Guests" (1695); and "The Italian Husband" (1698).

Ravenscroft, Thomas, an English composer; born in 1592. He was trained in St. Paul's choir, London, and received the degree of bachelor of music from Cambridge.

Rawal Pindi

the United States National Museum" (1879); "The Palenque Tablet in the United States National Museum" (1879); "Articles on Anthropological Subjects, 1853-1877" (1882); etc. He died in Philadelphia, Pa., July 25, 1887. By the will of Dr. Raw the United States National Museum in Washington received his valuable collection and library.

Rawal Pindi, a town and important military station of the Punjab, India, between the Indus and Jhelum rivers, 160 miles N. W. of Lahore. Since the extension of the railway to Peshawar, and since the last Afghan war, the town has increased at a rapid rate. There are an arsenal (1883), a fort, a fine public park, several European churches, including the garrison church, in which Bishop Milman of Calcutta, who died here, was buried (1876), and the headquarters of the Punjab Northern State Railway. The place carries on an active transit trade with Kashmere and Afghanistan. Here the Sikhs surrendered after their defeat at Gujrat (1849), and here too was held, in 1885, a great durbar or review, at which the Ameer of Afghanistan met Earl Dufferin, governor-general of India. Pop. (1901) 87,688. The division (area, 20,700 square miles; pop., 1901, 4,491,972) contains many of the towns connected with the Indian campaign of Alexander the Great.

Rawle, William (Brooke), an American lawyer; born in Philadelphia, Pa., Aug. 29, 1843; adopted for his surname Brooke-Rawle; was graduated at the University of Pennsylvania in 1863, and then joined the army as lieutenant-colonel. After the war he studied law and was admitted to the bar in 1867; became agent for the Penn estates in Pennsylvania, treasurer of the Law Association of Philadelphia, and secretary of the Pennsylvania Historical Society. His publications include "The Right Flank at Gettysburg" (1878); "With Gregg in Gettysburg Campaign" (1884); and "Gregg's Cavalry Fight at Gettysburg" (an address).

Rawle, William Henry, an American lawyer; born in Philadelphia, Pa., Aug. 31, 1823; was graduated at the University of Pennsylvania in 1841; was admitted to the bar in 1844 and attained eminence in practice. On the first call for volunteers in 1861 he joined the artillery in the Union army, and when a similar call was issued in 1863 he served as quartermaster. He was vice-provost of the Law Academy in 1865-1873, and vice-chancellor of the Law Association from 1880 till his death. His publications include "Law of Covenants for Title" (1852); "Equity in Pennsylvania" (1868); "Some Contrasts in the Growth of Pennsylvania in English Law" (1881); "Oration at Unveiling of the Monument Erected by the Bar of the United States to

Rawlinson

Chief-Justice Marshall" (1884); "The Case of the Educated Unemployed" (1885); etc. He died in Philadelphia, Pa., April 19, 1889.

Rawlins, John Aaron, an American military officer; born in Galena, Ill., Feb. 13, 1831. Before the Civil War he was a lawyer; adjutant-general of General Grant in September, 1861, and served as such in the campaigns of 1862 and 1863; in March, 1865, was appointed chief of General Grant's staff, with the rank of Brigadier-General in the U. S. A. He became Secretary of War in March, 1869. He died in Washington, D. C., Sept. 9, 1869.

Rawlins, Joseph Lafayette, an American legislator; born in Salt Lake co., Ut., March 28, 1850; was educated at the University of Indiana; was a Professor at the University of Deseret in Salt Lake City in 1873-1875; in the latter year was admitted to the bar, and practised till 1892, when he was elected a delegate to Congress. He was defeated for a second term in 1895, but was elected to the United States Senate in 1897. In 1902 he was a member of the Committees on Foreign Relations, Geological Survey, Immigration, Indian Affairs, Pacific Railroads, and Philippines.

Rawlinson, George, an English Orientalist; born in Chadlington, England, Nov. 23, 1812; educated at Cambridge; took a first-class in classics; became public examiner in 1854; preached the Bampton Lectures in 1859; was elected Camden Professor of Ancient History in 1861, and made a canon of Canterbury in 1872. Besides various short works on antiquity he published a translation of Herodotus with a commentary (1858-1860); "The Five Great Monarchies of the Ancient Eastern World" (1862-1867), followed by the Sixth (1873) and the "Seventh Oriental Monarchy" (1876); "History of Ancient Egypt" (1881); "Egypt and Babylon" (1885); "Phœnicia" (1889); "Mémorial of Major-General Sir H. C. Rawlinson" (1898); etc. He died Oct. 6, 1902.

Rawlinson, Sir Henry Creswicke, an English Orientalist and diplomatist; born in Chadlington, England, April 11, 1810; entered the East India Company's army in 1827. In 1833 he went to Persia to assist in organizing the Persian army. During the six years he spent there he began to study the cuneiform inscriptions, and made a translation of Darius' famous Behistun inscription, which he published in the "Journal of the Royal Asiatic Society." After he left Persia he held command of Kandahar during the troublous times of 1840-1842 (see AFGHANISTAN); was appointed political agent at Bagdad in 1844, and consul-general there in 1851. Five years later he returned home to England, was made K. C. B., and appointed by the crown director of the East India Company

Rawson

In 1858 he went back to Persia as British minister, but remained at Teheran only one year. Appointed a member of the Council of India in 1868, he was nominated its vice-president in 1876. Other public positions he held — the presidency of the Royal Geographical Society (1871), to whose "Proceedings" he contributed some valuable papers on Eastern subjects; a trusteeship of the British Museum (1879); a directorship of the Royal Asiatic Society. He was made a baronet in 1891. He wrote: "A Commentary on the Cuneiform Inscriptions of Babylon and Assyria" (1850); "Outline of the History of Assyria" (1852); "The Cuneiform Inscriptions of Western Asia" (edited with Norris and George Smith, 5 vols. 1861-1870); "England and Russia in the East" (2d ed. 1875); etc. He died in London, March 5, 1895.

Rawson, Edward Kirk, an American educator; born in Albany, N. Y., Feb. 21, 1846; was graduated at Yale University in 1868 and at the Andover Theological Seminary in 1872; was ordained in the Congregational Church and served as a chaplain in the United States navy in 1871-1890; was placed in charge of the Department of Ethics and English Studies at the United States Naval Academy in 1888 and was made superintendent of "Naval War Records," March 31, 1897. His publications include "Twenty Famous Naval Battles"; "Salamis to Santiago" (1899); and essays including "Anarchic Socialism"; "New Englander" (1884); "The Naval Chaplaincy" (1892); "The Rationale of Russian Socialism"; (1888); "Admiral Farragut"; etc.

Ray, of a composite flower, the outer or circumferential whorl of florets, as distinguished from those of the disk. In many composites the former are ligulate and the latter tubular. Medullary rays are vertical plates radiating from the pith to the bark through the wood of exogenous stems. In the cross section, the medullary rays constitute fine radiating lines; in a longitudinal section, they impart to the wood a satiny luster, which in the plane, the sycamore, etc., is so marked as to be highly beautiful. The medullary rays maintain a connection between the bark and the central part of a stem. Carpenters call medullary rays the silver grain.

In ichthyology, one of the radiating, bony rods serving to support the fins. They are of three kinds; (1) Simple; (2) Articulated (showing more or less numerous joints); and (3) Branched (dichotomically split, the joints increasing in number toward the extremity). The differences in the character of the rays in the dorsal fin are an important factor in classification. In optics, etc., a line of light proceeding from a radiant point, or a point of reflec-

Ray

tion. A collection of rays is called a pencil. An incident ray entering a doubly-refracting crystal is resolved into two, called from their properties an ordinary and an extraordinary ray. The term ray is used also of one of the component elements of light, as the violet rays of the spectrum; or the luminous, actinic, or heat rays: Visual ray, in perspective, a straight line drawn through the eye.

Ray, in ichthyology, any individual of the genus *Raja*; but the family *Rajidae*, and even the section *Batoidei*, are often spoken of as rays. Their flattened shape indicates that they live on level sandy bottoms, generally at no great distance from the coast and in moderate depths. They are carnivorous, but by no means active, swimming like the flat-fishes by the undulating motion of the pectoral fins, the thin flagelliform tail having entirely lost its locomotive function, and serving merely as a rudder. They may be divided into two groups: (1) rays proper, with a short snout, and (2) skates (attaining a much larger size) with a long, pointed snout. In species armed with bucklers or asperities it is the female which has these dermal developments, the male being entirely or nearly smooth. The color also frequently varies in the sexes. The *Myliobatidae* are popularly known as eagle rays, the *Torpedinidae* as electric rays, and the *Trygonidae* as sting rays.

Ray, or Wray, John, an English naturalist; born in Black Notley, Essex, England, Nov. 29, 1628. From Braintree free school he went to Cambridge, where he was fellow, Greek lecturer, mathematical tutor, and junior dean in Trinity College, but after a time began to devote himself entirely to the study of natural history. At the Restoration he accepted Episcopal ordination, but was ejected by the "Black Bartholomew" (1662). Thereupon, accompanied by a kindred spirit, Francis Willughby, a friend and former pupil of his own, Ray traveled over most of the United Kingdom, collecting and investigating botanical and zoological specimens; and in 1663 they started on a tour through the Low Countries, Germany, Italy, and France, with a similar object, Willughby taking the zoology under his charge, and Ray the botany. In 1667 Ray was elected a Fellow of the Royal Society. In 1672 his friend Willughby died, leaving him guardian of his two sons. After several changes of residence, in 1679 Ray settled down in his native village. As a botanist and zoologist he ranks very high, the classification of plants which he proposed being practically in the main the foundation of what is now known as the "Natural System" of classification. Ray's zoological works are considered by Cuvier as the foundation of modern zoology. The chief of his works on botany are "New

Ray

Method of Plants " (1682); "**Catalogue of the Plants of England**" (1670), the basis of all the subsequent floras of Great Britain; and "**History of Plants**" (1686-1704). His zoölogical works include the **Methodical Synopsis of Animals** " (1893) and three posthumous volumes on birds, fishes, and insects. He was also the author of some theological works. His friend Willughby, having collected the materials for an extensive work on the animal kingdom, left to Ray the task of arranging and classifying them. Ray died in Black Notley, Jan. 17, 1705.

Ray, George W., an American lawyer; born in Otselic, N. Y., Feb. 3, 1844; was reared on a farm and received his education at Norwich Academy. At the beginning of the Civil War he entered the Union army as a private in the 19th New York Volunteers and later was brigade clerk of the 1st Brigade, 1st Division, 19th Army Corps. After the war he studied law and was admitted to the bar in Nov. 1867; was a member of Congress in 1883-1885 and in 1891-1903; in 1902 was chairman of the Judiciary Committee and a member of the Committee on Irrigation of Arid Lands. He was a member of the New York State Republican committee in 1880, and was appointed judge of the United States District Court for the Northern District of New York in 1902.

Rayah, in Turkey, a person not a Mohammedan, who pays the capitation tax, called the haratch.

Rayleigh, John Strutt, 3d Baron, an English scientist; born in Essex, England, Nov. 12, 1842; was graduated, as senior wrangler, at Cambridge, in 1865; succeeded to the title of baron in 1873; in 1884 was president of the British Association; successor to Professor Tyndall as Professor of Natural Philosophy, in the Royal Institution, London, in 1887; Professor of Experimental Physics in the University of Cambridge (1879-1884). Columbia College, New York, bestowed on him the Barnard medal for "meritorious service to science" since he shares with Ramsey the merit of discovering the element ARGON (*q. v.*). He published scientific papers of great value; also "**The Theory of Sound**" (1877-1878).

Raymond, a village in Hinds co., Miss., 14 miles S. W. of Jackson. Three miles from here (at Farnder's creek) occurred a hotly contested battle between the Union and Confederate forces, May 12, 1863. The Confederates were under Gregg, the Unionists were commanded by Logan; each about 5,000 strong. After two hours' hard fighting, the Confederates withdrew, with a loss of 70 killed and 185 prisoners; wounded unknown. Union loss, 52 killed; 104 wounded.

Raymond

Raymond, the name of seven Counts of Toulouse. RAYMOND I. reigned 852-865. RAYMOND VI., son of RAYMOND V., born in 1156, succeeded 1194, and, being a friend of the Albigenses, was twice excommunicated, 1208 and 1211, and despoiled of his estates by Simon de Montfort, 1218; died 1222. RAYMOND VII., son of RAYMOND VI., and last Count of Toulouse, was born 1197, and after struggling with his father for the recovery of his possessions, vanquished Simon de Montfort in 1224. He was so enfeebled by these continual wars, however, that he submitted to a humiliating peace with the Pope and the King of France in 1229. He died 1242, leaving his estates to his only daughter, Jeanne, who had married Alphonse, Count of Poitiers, brother of Louis IX.

Raymond, Bradford Paul, an American clergyman; born in Stamford, Conn., April 22, 1846; was educated at Hamline University, Minn., and Lawrence University, Wis., and was graduated at the Theological School of Boston University and ordained in the Methodist Episcopal Church in 1874. He held pastorates in New Bedford, Mass., Providence, R. I., and in Nashua, N. H., and was president of Lawrence University from 1883 to 1889, resigning to become president of Wesleyan University, Middletown, Conn.

Raymond, Jerome Hall, an American educator; born in Clinton, Ia., March 10, 1869; received a public school education and was graduated at the Northwestern University in 1892; was private secretary to George M. Pullman in 1889-1890; traveled in Europe and Asia; made the circuit of the world in 1890-1892; was Professor of History and Political Science at Lawrence University, Appleton, Wis., in 1893-1894; accepted the chair of sociology and was made Secretary of the University Extension Department at the University of Wisconsin in 1895; served as president and Professor of Economics and Sociology at the West Virginia University in 1897-1901; associate professor of sociology at the University of Chicago in 1901-1909; then president of Toledo University.

Raymond, Henry Jarvis, an American journalist; born in Lima, N. Y., Jan. 24, 1820; was graduated at the University of Vermont in 1840; soon afterward removed to New York; and, while studying law, taught the classics and wrote for the "New Yorker." In 1841 he became managing editor of the New York "Tribune," and afterward leading editor of the New York "Courier and Enquirer." In 1849 he was elected to the State Assembly; was reelected and made speaker, but relinquished his position on the "Courier," and traveled in Europe on account of ill health. On his return to New York, in 1851, he established the New York "Times." In 1852 he became a delegate to

Raymond

the Baltimore Convention, and in 1856 a leader of the Republican party, and was chosen lieutenant-governor of New York. He was a delegate to the Chicago Convention of 1860; was again elected to the State Legislature, and, in 1864, was chosen as representative from New York to the 39th Congress. He, subsequently, in 1866, was the leading spirit of the Wigwam Convention in Philadelphia, the resolutions of which body were from his pen. He died in New York, June 18, 1869.

Raymond, John T., right name JOHN O'BRIEN, an American actor; born in Buffalo, N. Y., April 5, 1836. He was educated for a mercantile life, but the humdrum ways of business did not suit him. He first appeared on the stage as Lopez in the "Honeymoon," June 27, 1853, in Rochester. The following year he played Timothy Quaint in the "Soldier's Daughter." His greatest characters were those of Asa Trenchard in "Our American Cousin" and Colonel Sellers in the "Gilded Age." In 1867 he went to England. He died in Evansville, Ind., April 10, 1887.

Raymond, Rossiter Worthington, an American metallurgist; born in Cincinnati, O., April 27, 1840; was graduated at the Brooklyn Polytechnic Institute in 1858 and studied for some time in Germany. He practised in New York city as a consulting engineer in 1864-1868; was United States commissioner of mining statistics in 1868-1876; lectured on economic geology at Lafayette College in 1870-1872; was president of the American Institute of Mining Engineers in 1872-1874; and was reelected in 1884. He was United States commissioner to the Vienna Exposition in 1873; New York State commissioner of electric subways for Brooklyn in 1885; and the author of the "Mineral Resources of the United States, West of the Rocky Mountains," "Glossary of Mining and Metallurgical Terms" and numerous other essays and papers on technical subjects.

Raymond, William Galt, an American civil engineer; born in Princeton, Ia., March 2, 1859; studied at the Kansas State University and was graduated at Washington University in 1884; was instructor of civil engineering at the California State University in 1884-1890; and accepted the chair of geodesy, road engineering, and topographical drawing at the Rensselaer Polytechnic Institute in 1892. He published "Plane Surveying" (1896); and many technical papers.

Raynal, Guillaume Thomas François, known as the ABBÉ RAYNAL, a French historian and political writer; born in St. Geniez, France, April 12, 1711. He acquired a European reputation by his "Philosophical History of the Two Indies." He was a

Razorbill

great partisan of the encyclopædists, Diderot, Holbach, Helvetius, etc., and a man of remarkable benevolence. He died in Paris, March 6, 1796.

Raynouard, François Juste Marie, a French poet and philologist; born in Brignolles, Provence, France, Sept. 18, 1761. He studied at Aix, and became a prosperous advocate, and in 1791 was sent to the Legislative Assembly, where he joined the Girondins. Flung into prison, he was fortunately forgotten till the fall of Robespierre brought release. His poems and tragedies were successful, and in 1807 he was elected to the Academy, of which he became perpetual secretary in 1817. A member of the imperial legislative body from 1806, he continued to produce dramas, but toward the fall of the empire turned his attention to linguistic and particularly Provençal studies. His researches into the origin and transformations of this tongue led to many valuable discoveries, though his theories as to the relation of the language of the troubadours to the other Romance tongues are not now accepted. Raynouard died in Passy, near Paris, Oct. 27, 1836.

Razor, a keen-edged steel instrument for shaving off the beard or hair. The edge and back of the blade are more or less curved, and the sides are slightly hollowed in grinding. It is usually made with a tang, which is fastened to the handle by a rivet. The handles are made of a great variety of materials. The great center of the razor manufacture is Sheffield, England. The savages of Polynesia still use two pieces of flint of the same size, or pieces of shells or sharks' teeth ground to a fine edge for shaving.



A RAZORBILL.

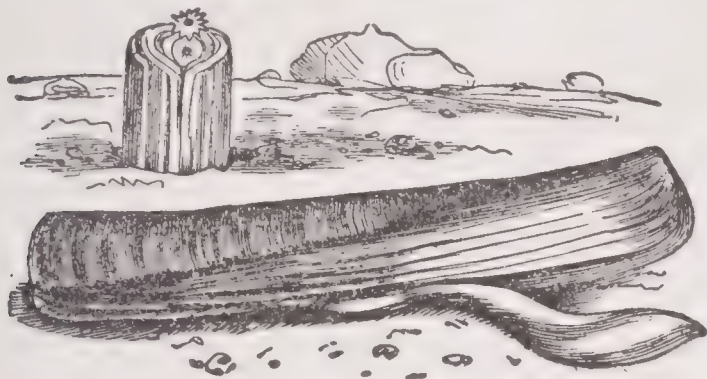
Razorback, one of the largest species of the whale tribe, the *Balænoptera* or *Rorqualus borealis*, the great rorqual (see RORQUAL). Also a name given to a kind of hog, especially in the S. part of the United States.

Razorbill, in ornithology, the *Alca torda*, the sole species of the genus *Alca impennis*, the great auk, being extinct. It is about a foot and a half long, plumage of

Razor Fish

head, neck, and upper surface brilliant black, under surface pure white. They make no nest, but lay a single white or yellowish egg, blotched and streaked with dark-brown, on the bare rock. Called also the black-billed auk and murre.

Razor Fish, a species of fish with a compressed body, much prized for the table. It is the *Coryphæna novacula*.



RAZOR SHELL.

Razor Shell, a genus of lamellibranchiate mollusca, forming the type of the family *Solenidae*. They are common on both sides of the Atlantic; the shells are sub-cylindrical in shape; the hinge-teeth number two on each valve; and the ligament for opening the shells is long and external in position. The mantle is open in front, to give exit to the powerful muscular "foot," used by these mollusks for burrowing swiftly into the sandy coasts which they inhabit. These curious mollusks always live buried in the sand in an upright position, leaving only an opening shaped like a keyhole, which corresponds with the two siphon tubes. They are generally found at a depth of one or two feet, and when they make their burrows, as they are often in the habit of doing, among the rocks, not even the hooked iron can draw them from their retreat. The familiar species are the *Solen siliqua*, *S. ensis*, *S. vagina*, *S. marginatus*, and *S. pellucidus*.

Razzi, Giovanni Antonio (Gianantonio), surnamed SODOMA, an Italian painter; born in Vercelli, Piedmont, in 1479. At an early age he was brought to Siena, and as most of his life was spent there he is considered one of the painters of the Siennese school. He painted chiefly in fresco, and was employed by Julius II. to decorate in the Vatican, but his best work is in the churches of Siena. He died in Siena, Italy, in 1549.

Re. See RA.

Ré, Ile de, a small, low-lying island off the coast of the French department of Charante-Inférieure, opposite the city of La Rochelle, from which it is separated by the Pertuis Breton. It is about 18 miles long and 3 broad, measures 28 square miles, and has about 15,000 inhabitants, who are chiefly engaged in the preparation of salt (32,-

Reaction

000 tons annually). The W. coast is rocky; on the E. side there are some good harbors. Oyster farming has of late become an important branch of industry (35,000,000 annually). Wine is made and exported. The chief town, St. Martin, was fortified by Vauban.

Rea, George Bronson, an American electrical engineer; born in Brooklyn, N. Y., Aug. 28, 1869; was educated by private tutors; went to Cuba, where he practised his profession till the beginning of the revolution; accompanied the insurgent forces of Gomez and Maceo as special correspondent of the New York "Herald"; was present at 80 engagements between Cubans and Spaniards, and was wounded in the action at La Portela. He was present at the bombardment of San Juan, Porto Rico, and in the operations before Santiago as correspondent for the New York "World." In the early part of the Porto Rico campaign he traveled through the island as an agent in the secret service of the United States government, and acquired information of large value to the American military authorities. He is the author of "Facts and Fancies about Cuba."

Reach, Angus Bethune, an English journalist; born in Inverness, Scotland, Jan. 23, 1821. His first production, "Labor and the Poor" (1848), was a very noted series of articles published in the London "Morning Chronicle." He wrote: "The Comic Bradshaw; or, Bubbles from the Boiler" (1848); "Clement Lorimer; or, The Book with the Iron Clasp," a romance (1849); "Leonard Lindsay; or, The Story of a Buccaneer" (1850); "Claret and Olives" (1852); and many amusing miscellanies and farces. He died in London, England, Nov. 25, 1856.

Reaction, in chemistry, the chemical change or effect produced by bringing at least two elements or compounds together whereby one or more new bodies are formed, which may consist either of a gas, liquid, or solid, or a mixture of these; as when sulphuric acid is added to chalk, the products of the reaction are sulphate of lime, water, and carbonic acid gas. A more obscure kind of reaction is brought about by the interposition of change of temperature, sunlight, and the galvanic current.

In pathology, action of one kind in antagonism with action of another; action immediately following on action of a directly contrary character; or a state succeeding to a directly contrary one, as the exhaustion consequent on a paroxysm of fever.

In physics, the action of one body on another one acting on it in the opposite direction. It is always equal and contrary to action, *i. e.*, the mutual actions of two bodies on each other are forces equal in

Read

amount and opposite in direction. Reaction period, in physiology, the time that elapses between the application of a stimulus to the nerves, and the contraction of the muscles following it in consequence. Roughly speaking, it is for feeling one-seventh, for hearing one-sixth, and for sight one-fifth of a second. The portion of this time required to perceive and to will is called the reduced reaction period; it is less than a tenth of a second. If a more complex mental decision has to be formed, the time required is longer.

Read, Hollis, an American clergyman; born in Newfane, Vt., Aug. 26, 1802; was graduated at Williams College in 1826, and received his theological training at Princeton Theological Seminary; was ordained in the Presbyterian Church in 1829, and went to Bombay, India, in 1830, where he remained five years. Returning to the United States he held various pastorates and was engaged in other religious work. His publications include "Journal in India" (1835); "The Hand of God in History" (1852); "Palace of the Great King" (1855); "Commerce and Christianity" (1856); "India and Its People, Ancient and Modern" (1858); "The Negro Problem Solved, or Africa as She Was, as She Is, and as She Shall Be" (1864); etc. He died in Somerville, N. J., April 7, 1887.

Read, John Elliot, an American journalist; born in South Amherst, Mass., Jan. 4, 1845; received a public school education; contributed principally to agricultural papers and frequently to religious and literary periodicals; and was associate editor of "The Working Farmer" in New York for several years. In 1899 he became corresponding editor of "The Practical Farmer," Philadelphia, Pa. His publications include "Farming for Profit"; "Life Triumphant: A Study of the Nature, Origin and Destiny of Man" (1900); etc. He contributed numerous articles on agriculture, horticulture, and live stock to the last 18 volumes of the "Columbian Cyclopædia" (1889-1894). He also wrote "A Brief History of the Principal Earlier Arctic Explorations from the Ninth Century to the Peary Expedition" (in the concluding section of "Nansen in the Frozen World" 1897).

Read, John Meredith, an American jurist; born in Philadelphia, Pa., July 21, 1797; was graduated at the University of Pennsylvania in 1812; admitted to the bar in 1818. He held a seat in the Pennsylvania Legislature in 1822-1823; was United States attorney for the Eastern District of Pennsylvania in 1837-1844; and served as chief-justice and attorney-general of Penn-

Read

sylvania, and solicitor-general of the United States in 1860-1874. He was long a Democrat, and was prominent in the founding of the Free-soil branch of that party. He affiliated with the Republican party when it was formed and in the presidential campaign of 1856 made an address on the "Power of Congress over Slavery in the Territories," which had much influence throughout the country. In 1858, on the first victory of the Republican party in Pennsylvania, he was elected judge of the Supreme Court by a majority of 30,000. In 1860 he was mentioned as a candidate for the presidential nomination with Abraham Lincoln for Vice-President, but early in that year Simon Cameron defeated the movement in the Pennsylvania Republican Convention. Several votes, however, were cast for him in the Chicago Convention, though he exerted all his influence in favor of Lincoln. He was the author of "Views on the Suspension of the Habeas Corpus" which became the basis of the law of March 3, 1863, authorizing the President to suspend the *habeas corpus* act. His opinions are found in 41 volumes of reports. The best known of his numerous published addresses include "Plan for the Administration of the Girard Trust" (1833); "The Law of Evidence" (1864); "Jefferson Davis and His Complicity in the Assassination of Abraham Lincoln" (1866); etc. He died in Philadelphia, Pa., Nov. 29, 1874.

Read, John Meredith, an American diplomatist; born in Philadelphia, Pa., Feb. 27, 1837; was graduated at Brown University and went through a legal course at the Albany Law School, taking honors; was also a student in a military school. When the Civil War broke out he enlisted and while in service early attained the rank of Brigadier-General of volunteers. In 1868 he was appointed United States consul-general at Paris, and during the Franco-Prussian War, 1870-1871, he acted as consul-general for Germany in France. During the same time his duties included that of United States consul-general in Algeria. During the two sieges of Paris, 1870-1872, he saw that protection was given to German citizens in the city. He was United States minister in Greece in 1873-1880. He wrote "Historical Inquiry Concerning Henry Hudson." He died in Paris, France, Dec. 27, 1896.

Read, Nathan, an American inventor, claimed to have been the first to use steam engines for propelling boats and carriages; born in Worcester co., Mass., in 1759. He entered Harvard College in 1777; was graduated in 1781; studied medicine; and started the Salem iron factory in 1796. In 1807, he removed to Belfast, Me., and took

Read

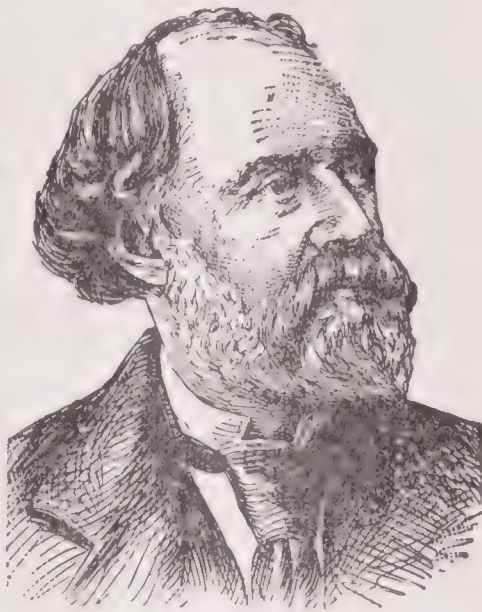
out a patent for an improved steam engine boiler in 1791. The differences between this and Stephenson's "Rocket" boiler have been minutely pointed out. The multitubular boiler is claimed for Read, through his patent and drawings. As a substitute for the old one, he converted the condensing engine of Watt into a complete working, portable, high-pressure engine, 12 years before the high-pressure engine was known. Oliver Evans used it for grinding plaster and sawing marble in Philadelphia in 1801. In 1790 he petitioned Congress for a patent for land carriages to be driven by steam. It created so much amusement that he withdrew it. He built, in 1789, a small steamboat, substantially identical with Fulton's of 1807; but he withdrew his request for a patent in 1790, under a misapprehension. It is alleged that his combinations amounted to the inland steamers now in use. He got a patent in August, 1791, for a portable-furnace boiler and other inventions, at the same time with Fitch, Rumsey, and Stevens. These clash with one another, but not with Read's. The system of paddles, afterward ascribed to Stevens, is also claimed for Read, who, it is stated, intended to assert his claims, but procrastinated the work, and died when he had only arranged a memorandum, in Belfast, Me., in 1849.

Read, Opie, an American journalist; born in Nashville, Tenn., Dec. 22, 1852. He established and edited for many years the "Arkansaw Traveler." His studies of Arkansas life have been widely read, and include: "Len Gansett" (1888); "My Young Master"; "An Arkansaw Planter"; "Up Terrapin River"; "A Kentucky Colonel"; "On the Suwanee River"; "Miss Polly Lop, and Other Stories"; "The Captain's Romance"; "The Jucklins," a novel; "Bolanyo"; "A Yankee from the West"; "A Tennessee Judge"; "In the Alamo" (1900); etc.

Read, Thomas Buchanan, an American portrait-painter and poet; born in Chester co., Pa., March 12, 1822. His most important works are: "Poems" (1847); "Lays and Ballads" (1848); "The House by the Sea" (1856); "The Wagoner of the Alleghanies" (1862); "A Summer Story" (1865); and "Poetical Works" (1867). His best known poems are "Sheridan's Ride" and "Drifting." He also published: "Female Poets of America" (1848); "The Pilgrims of the Great St. Bernard," a romance; "The New Pastoral" (1854), his most ambitious poem; "Sylvia; or, The Lost Shepherd" (1857); "A Voyage to Iceland" (1857); and "The Good Samaritans" (1867). He died in New York, May 11, 1872.

Reade

Reade, Charles, an English novelist; born in Ipsden House, Oxfordshire, England, June 8, 1814. He was educated at Oxford, and so distinguished himself as to secure a fellowship. In 1843 he was called to the bar as a member of Lincoln's Inn; but his legal studies may be presumed to have been merely nominal, and it soon became obvious that his chosen career was that of literature.



CHARLES READE.

The books by which he first became known were his "Peg Woffington" and "Christie Johnstone." Among his subsequent works are: "The Course of True Love"; "White Lies"; "The Cloister and the Hearth"; "Hard Cash"; "Griffith Gaunt"; "Put Yourself in His Place"; "A Terrible Temptation"; "A Simpleton"; "Never Too Late to Mend"; "Foul Play," etc.; and the plays "Gold Masks and Faces" (with Tom Taylor); "A Scuttled Ship" (with Boucicault). He adapted M. Zola's "L'Assommoir" for the English theater, under the title "Drink." His last novel was "A Perilous Secret." He died in London, England, April 11, 1884.

Reade, John, an Irish-Canadian clergyman and journalist; born in Ballyshannon, Ireland, Nov. 13, 1837. He went to Canada in 1856, where he engaged in teaching, law, preaching, and journalism, and contributed to every magazine or review established in Canada after 1860. His writings include: "The Prophecy and Other Poems" (1870); "Language and Conquest" (1883); "The Making of Canada" (1885); "Literary Faculty of the Native Races of America" (1851); "The Half-Breed" (1886); "Vita Sine Liberis" (1886); and "Aboriginal American Poetry" (1887).

Reade, William Winwood, an English traveler; born in Ipsden, Oxfordshire, England, Jan. 30, 1838. On his return from African journeys, he wrote: "Savage Africa" (1863); "The African Sketch-Book" (1873); "Story of the Ashantee Campaign" (1875); and several novels. His masterpiece is probably "The Martyrdom of Man," which presents the history of all the forms of human slavery (1872; 13th ed. 1890). He died in Wimbledon, England, April 24, 1875.

Reader

Reader, specifically, one whose office it is to read prayers, lessons, lectures, and the like to others; as (a) in the Roman Catholic Church, one of the five inferior orders of the priesthood; (b) in the English Church, a deacon appointed to perform divine service in churches and chapels, of which no one has the cure. (c) A kind of lecturer or professor in universities, etc. (d) In printing offices, a proof-reader is a person who reads and corrects proofs. See **PRINTING**.

Reader, Francis Smith, an American journalist; born in Coal Center, Pa., Nov. 17, 1842; received a collegiate education; was connected with the United States Civil Service for 10 years; served with the Union army throughout the Civil War; was taken prisoner, June 20, 1864, while on scout duty, but escaped with three others while on the way to Andersonville. Later he became editor of the "Beaver Valley News." His publications include: "Life of Moody and Sankey" (1890); "History of the 5th West Virginia Cavalry" (1890); "History of New Brighton, Pa." (1899), and also the articles, "Sketches of Beaver Valley, Pa." (1872), and "History of the Harmony Society" (1873).

Reading, a city and county-seat of Berks co., Pa.; on the Schuylkill river, the Schuylkill canal, and the Pennsylvania, the Philadelphia and Reading, and the Wilmington and the Northern and other railroads; 54 miles E. of Harrisburg; 58 miles N. W. of Philadelphia. The city is regularly laid out on a site gradually rising to picturesque hills, which not only afford fine scenic views, but give a copious supply of pure water. Here are waterworks owned by the city and costing \$1,500,000, gas and electric lights, inclined gravity, and electric railroads, several National and State banks, and Mineral Springs and Penn's Common parks. The charitable institutions include the Reading, St. Joseph's, and the Homeopathic Medical and Surgical Hospitals, several dispensaries, and a Home for Orphans. The city contains about 60 churches, about 40 school buildings, and public school property valued at over \$700,000. There are upward of 500 manufacturing establishments, with a combined output valued at over \$21,000,000, and employing nearly 13,000 persons. Reading is the seat of the Philadelphia and Reading railroad car and machine shops. The chief manufactures are foundry and machine shop products, iron and steel, stoves, woolen hats, brick and tile, cigars and cigarettes, malt liquors, and planing mill products. The assessed property valuation aggregates nearly \$40,000,000, and the total bonded debt is about \$1,370,000. Reading was settled in 1748, became a borough in

Real Composition

1783, and a city in 1847. Pop. (1890) 58,661; (1900) 78,961; (1910) 96,071.

Reading, a parliamentary and municipal borough of England; capital of the county of Berks; on the Kennet, near its confluence with the Thames; 36 miles W. of London. The town is well built and laid out, and there are an assize hall, the Royal Berkshire hospital, a town hall of recent erection in the Renaissance style, a grammar school, etc. The industrial establishments include a large and celebrated biscuit factory, iron foundries, breweries, corn mills, etc., and there is a considerable agricultural trade. There are interesting remains of a magnificent abbey founded by Henry I., who was buried within its precincts in 1135. Pop. (1901) 72,214.

Reagan, John Henninger, an American jurist; born in Sevier co., Tenn., Oct. 8, 1818. At the age of 21 he settled in Texas; practised law and farming; served two years in the State House of Representatives; in 1856 was elected judge of the district court for six years, but resigned the office to go to Congress from the 1st District in 1867; during the Civil War was Postmaster-General of the Confederate States, and Acting Secretary of the Confederate Treasury; was a member of the Constitutional Convention of his State in 1875, and member of Congress in 1875-1887; was United States Senator in 1887-1891; and afterward chairman of the Texas State Railroad Commission. He died March 6, 1905.

Reagent, in chemistry, any substance employed to bring about a chemical reaction or change in another element, or compound, with the view generally of either detecting its presence or effecting its separation from other substances.

Real, the old unit of value in Spain. By the monetary law of June, 1864, the silver real was made to weigh 1.298 grammes, .81 fine, and equivalent to $4\frac{1}{2}$ cents. The real has varied in value from $4\frac{1}{2}$ to 10 cents.

Real, in law, pertaining to things fixed, permanent, or immovable. Thus real estate is landed property, including all estates and interest in lands which are held for life or for some greater estate, and whether such lands be of freehold or copyhold tenure. So a real action is an action brought for the specific recovery of lands, tenements, and hereditaments.

Real Composition, in law, an agreement made between the owner of land in countries having an endowed church and the parson or vicar, with consent of the ordinary, that such lands shall be discharged from payment of tithes, in consequence of other land or recompense given to the parson in lieu and satisfaction thereof.

Realf, Richard, an English-American poet; born in Framfield, Sussex, England, June 14, 1834. At 18 he published, under the patronage of several literary people, a collection of poems, "Guesses at the Beautiful." In 1854 he came to the United States, enlisted in the army in 1862, and wrote some of his best lyrics in the field. His most admired poems are: "My Slain," "An Old Man's Idyl," and "Indirection." He died in Oakland, Cal., Oct. 28, 1878.

Realgar, a monoclinic mineral, occurring but rarely in crystals, but mostly granular to compact-massive. Hardness, 1.5-2; sp. gr., 3.4-3.6; luster, resinous; color and streak, aurora-red to orange-yellow; transparent to translucent; fracture, conchoidal; brittle. Composition: Sulphur, 29.9; arsenic, 70.1=100, which is equivalent to the formula AsS. Occurs in fine crystals in Hungary and Transylvania, and massive in many localities, frequently associated with orpiment; on exposure to light changes to orpiment. In chemistry, AsS₂. A sulphide of arsenic formed artificially by heating arsenic acid with the proper proportion of sulphur. It is a fusible and volatile substance, having an orange-red color, is used for painting and for the production of white-fire.

Realism, in philosophy, a doctrine diametrically opposed to Nominalism, as involving the belief that genus and species are real things, existing independently of our conceptions and their expressions, and that these are alike actually the object of our thoughts when we make use of the terms. Again, as opposed to Idealism, the word implies an intuitive cognition of the external object, instead of merely a mediate and representative knowledge of it.

In art and literature the word realism or naturalism is employed to describe a method of representation without idealization, which in our day in France has been raised to a system and claims a monopoly of truth in its artistic treatment of the facts of nature and life. It claims that the enthusiasms and exaggerations of romanticism must give place to a period of reflection and criticism; that we must not select from the facts put before our eyes, but merely register them and the sensations they engender for themselves alone, apart from all considerations of mere beauty, to say nothing of religion or morality; and that the experimental romance must hereafter follow the rigid methods of science, in being based alone on "human documents" supplied from the close observation of the present, or from laborious erudition—the retrospective observation of the past. As a gospel this militant realism is the offspring of the positive philosophy and the physiology and psychology of the age; and in effect, in the

hands of its apostles, it has become a new morality which reforms not by precept but example, not by the attraction of the good, but by the repulsion of the evil. The practical result is that for French realists there is in the moral world only the evil, in the visible world only the ugly, and the triumphs of modern fiction are the pitiless impersonality of "Madame Bovary," the cold splendors of "Salammbô," the brutal vulgarities of Zola, the refined sensualism of Bourget and Guy de Maupassant, the pretentious inanities of the Goncourt brothers, and the dreary pessimism of Dostoievsky and Tolstoi. If realism were perfect it would include all reality, order as well as disorder, the general as well as the particular, the lofty as well as the low. For there are men and women who are neither selfish nor drunken, nor lecherous; your experimental cesspool is not Paris, your Paris is not the universe; your hospital wards may contain cases of all moral maladies, but you forget the moving world of health and life outside its walls; your vaunted collection lacks one specimen, not the rarest, and certainly the most beautiful. For the dream is as true a leaf of life as the sober vision, and idealism is the permanent revenge of man over the inequalities of life—the protest of creative mind against external fatality. Idealistic art seizes life at its richest moments, and presents it preserved forever by its immaterial essence from inconstancy and degradation. This so-called realism is not reality—the steps of true art must ever be elimination and generalization; its postulates, the eternal conventions of form, style, language, and subject, necessary because they are elemental.

Reaping Machines. As far back as B. C. 1400-1500 we have records of instruments for reaping corn. They did not differ in any essential respect from the modern sickle, and they were practically the only known means of reaping corn until the Romans introduced the scythe, which, as they used it, was half-away between the ancient sickle and the modern scythe. Further than the gradual addition of one to four fingers the ages brought no radical change in the scythe until the Americans introduced the cradle scythe at the end of the eighteenth century. But the genesis of the modern reaping machine did not lie in the sickle or the scythe, but rather in the "Gallic header," an extremely simple contrivance used in the lowlands of Gaul and mentioned by Pliny in A. D. 23. It consisted of large box on wheels with projecting teeth in front, and was pushed through the corn by an ox. The teeth caught and tore off the heads of corn which were placed in the box by an attendant. Variations of the "Gallic header," or slight im-

Reaping Machines

provements on it, were in vogue for many centuries.

The first mechanical reaper of any significance was a reciprocating and advancing motion machine invented by one Salmon, of Woburn, England, in 1807. Its cutter consisted of vibrating knives over stationary cutters, and it had a rake to sweep the grain from the platform. A side draught machine with straight-edged reciprocating knife over stationary fingers, reels, dividers, and platform was brought out by Henry Ogle in 1822. The most successful machine invented about this time was that of Patrick Bell, also an Englishman. Its cutter worked on the shear principle, and the cut grain was carried to one side by revolving rollers. It had reels and dividers, and was pushed through the grain.

In the meantime reaping machines in America had been developing along the same lines as in England, and probably borrowing something therefrom. The most important of these was that patented by Jeremiah Bailey, of Pennsylvania, in 1822. It had a revolving cutter, side draught, and an arrangement to keep the cutter a certain height from the ground. William Manning, of New Jersey, patented a machine in 1831, which in addition to the features common to other machines of the time, possessed a grain divider, the first contrivance of the kind to be used on an American machine. In 1834, however, a machine was brought out by a man who was destined to revolutionize the reaping-machine industry of the world. This was Cyrus H. McCormick, a Virginia farmer. McCormick really invented his machine in 1831. It was balanced on two wheels, one of which was geared to furnish power for the mechanism, and had serrated knife, divider, revolving reels and side-draught. The divider and revolving reels separated the grain to be cut from the standing grain, and laid the swath with perfectly parallel straws on the platform.

In 1833 an eccentric genius named Obed Hussey invented a machine which, it was often claimed, suggested McCormick's. But, apart from the fact that McCormick's machine was invented first, Hussey's was rather a mower than a reaper. It had no reel or divider, and it never worked well as a reaper, though with a few modifications it became a successful mower. A self-acting rake, which swept over a quadrantal platform and left the grain in sheaves at the side of the machine, was invented by Nelson Platt in 1848. Many improvements in this rake were patented within the next ten years, notably by William H. Seymour in 1851 and Owen Dorsey in 1856. McCormick brought out a sweep-rake in 1861, which differed materially from Platt's invention, and was based on the patent obtained by S. A. Lindsay in 1859.

Reason

But the self- or sweep-rake was quickly supplanted by the binder. The first patent for a twine or cord binder was obtained by John E. Heath, of Ohio, in 1850. Improvements came quickly and in large numbers. An arrangement which allowed the driver to regulate the size of the gavels was patented by Johnston in 1865. The general principle of most self-binding machines is the same. The grain is delivered by elevating aprons on a slanting platform. Iron packers work continuously through slots in the platform and rake the grain down to the knotter and upon a trip-finger which automatically puts the knotter in action when enough grain has been accumulated for a bundle. The knot is tied in the cord by the revolution of a bill-shaped hook with a hinged tongue moved by a cam. In the modern machines of the best class there are countless devices for insuring speed, accuracy and strength, and the mechanism is extremely complicated. The accompanying illustration of the Adriance, Platt binder shows how such a machine looks. It can reel, cut, and bind grain in any position and on the most uneven soil, and will bind the grain as close to or as far from the butts as may be desired, even though many different lengths occur in the same field. The crowning triumph of modern agricultural machinery is the combined harvester. This machine is a header, thresher, separator, fanning-mill, sacker, and straw carrier all in one. It would require over 1,000 men to do, according to the methods of a hundred years ago, as much work in a day as one such machine does. The larger of those machines are usually driven by steam power, and it requires seven men to attend to one of them. Such a machine will cut 60 to 125 acres per day, according to size, and thresh 1,700 to 3,000 bushels daily. These machines are used extensively in the big grain districts of the Western United States and Australia, where the amount of the harvest is very great and the danger of rain during harvesting operations is slight.

Reason, in logic, the premise or premises of an argument, and especially the minor premise. In metaphysics, the power of thinking consecutively; the power of passing in mental review all the facts and principles bearing on a subject, and, after a careful consideration of their bearings, drawing conclusions in many cases conformable with truth. Reason, weighing facts, discovers the law of gravitation, calculates eclipses, weighs the planets, ascertains the constituent elements of the sun, and even of more distant worlds. It can exercise itself on the most abstract and spiritual theories, as well as on those of a simpler character. Reid distinguished between reason and judgment, considering the sphere of the

former to be propositions capable of demonstration. Stewart considered the word reason as ambiguous. In common discourse it denotes the power of discriminating truth from falsehood, and right from wrong. To these he adds the power of devising means to accomplish ends; or reason may be limited to the power of distinguishing truth from falsehood; or it may be used of our rational power in general, or of the discursive faculty alone. Brown thinks that there is no faculty of reason, which is nothing more than a series of relative suggestions. Immanuel Kant's "Critique of Pure Reason" appeared in 1781. Mill considers reasoning in its extended sense to be synonymous with inference, and divides it into induction, *i. e.*, reasoning from particulars to generals, and ratiocination, reasoning from generals to particulars. Formerly it was believed that of the whole visible creation man alone was capable of reasoning; but Darwin considers that only a few persons now dispute that animals possess some power of reason. Their actions may be due to instinct or to the association of ideas, the last-named principle being connected with reason.

In history: On Nov. 10, 1793, the French National Convention ordered the worship of the Goddess of Reason. Madame Maillard, selected as such a goddess, was drawn on a splendid car to the cathedral of Notre Dame to receive homage from the multitude. For some time afterward that cathedral was designated the Temple of Reason.

Reatinus. See VARRO, MARCUS TERENTIUS.

Réaumur, René Antoine Ferchault de, a French physicist and naturalist; born in La Rochelle, France, Feb. 28, 1683. He studied under the Jesuits at Poitiers and afterward at Bourges; went to Paris in 1703; in 1708 was chosen a member of the Academy of Sciences; and for nearly 50 years continued to be one of its most active members. As a natural philosopher he is celebrated for the invention of an improved thermometer, which he made known in 1731, but his greatest work is "Natural History of Insects" (6 vols.). He died in Maine, France, Oct. 18, 1757.

Reaumur's Scale, a scale for a thermometer, in which the two fixed points being as in the Centigrade, the division is into 80 instead of 100 parts. It is still occasionally used.

Reaumuriaceæ, in botany, reaumuriads; an order of hypogynous exogens, alliance Guttiferales; small shrubs, with fleshy scale-like exstipulate leaves, covered with resinous sunk glands. Flowers surrounded by imbricated bracts; petals five, hypogynous, with unequal sides; stamens definite

or indefinite, monadelphous or polyadelphous. Fruit capsular, two to five-valved two to five-celled, seeds definite in each cell. From the coasts of the Mediterranean and the salt plains of temperate Asia. Known genera three, species four.

Reavis, James Bradly, an American jurist; born in Boone co., Mo., in 1848; was educated at the Kentucky University, and admitted to the Missouri bar in 1872; settled on the Pacific coast in 1874 and in Washington Territory in 1880, and there practised; was elected to the upper branch of the Washington Territorial Council in 1888. He served as regent of the Territorial University of Washington till statehood. In 1889 he was defeated as candidate for judge of the Supreme Court of Washington by the Republican candidate, but was chief-justice of that court in 1896-1902.

Reavis, Logan Uriah, an American journalist; born in Sangamon Bottom, Ill., March 26, 1831; was educated in the common schools. In 1855 he became connected with the "Gazette" in Beardstown, Ill.; and subsequently acquired control of that paper and published it as "The Central Illinoian." In 1866 he removed to St. Louis, to which city he strenuously advocated the removal of the National capital. To promote this object he lectured extensively in all parts of the country and published the pamphlets, "The New Republic, or the Transition Complete, with an Approaching Change of National Empire, based upon the Commercial and Industrial Expansion of the Great West" (1867), and "A Change of National Empire, or Arguments for the Removal of the National Capital from Washington to the Mississippi Valley." He went to England in 1879 to inaugurate a movement for the promotion of immigration to Missouri. Besides the above his publications include: "St. Louis the Future Great City of the World" (1867); "A Representative Life of Horace Greeley" (1872); "Thoughts for the Young Men and Women of America" (1873); "Life of General William S. Harney" (1875); and "Railway and River System" (1879). He died in St. Louis, Mo., April 25, 1889.

Rebec, or Rebeck, the English name of a three-stringed musical instrument played with a bow. It was of Arabian or Turkish origin, and in its earliest form it probably had a long neck and small round body, made of cocoanut shell, or some such material, over which parchment was stretched to form the sound board. After its introduction into Europe, the third string was added, for though the Persians have now a three-stringed rebab, the older form was probably only two-stringed. After its introduction

Rebecca

into England, the rebec gradually assumed the form of a viol, of which it was the precursor.

Rebecca, a name given to the leader of certain Welsh rioters in 1843, whose object was to demolish turnpike gates. The leader and his followers were dressed in women's clothes, and were known as "Rebecca and her daughters." The name was taken from Rebekah, the bride of Isaac. When she left her father's house, Laban and his family "blessed her," and said, "Thou art our sister . . . let thy seed possess the gate of those that hate them" (Gen. xxiv: 60).

Rebekah, Daughters of, a degree in the ritual of Odd Fellowship, to which women are admitted. See ODD FELLOWS.

Rebellion, the taking up of arms, whether by natural subjects or others, residing in the country, against a settled government. By international law rebellion is considered a crime, and all persons voluntarily abetting it are criminals whether subjects or foreigners. When a rebellion has attained such dimensions and organization as to make of the rebel party a state *de facto*, and its acts reach the dimensions of war *de facto*, it is now the custom of the state to yield to the rebels such belligerent privileges as policy and humanity require, and to treat captives as prisoners of war, etc.

Rebel Yell, "Y-Yō-Yō — Wō-Wō," the war-cry of the Confederate soldiers in the American Civil War of 1861-1865. It was adopted by the soldiers of the United States in the American-Spanish War. The sound has nothing of the nature of a cheer. It is a wild, unearthly cross between a screech and a yell that is calculated not only to strike terror to the enemy, but to incite and encourage our own soldiers, who, when they have charged within 30 yards of their foe, dash forward from a double-quick to a mad rush, wildly yelling, "Y-Yō-Yō—Wō-Wō," for the triple purpose of encouraging each other and confusing and terrorizing the enemy.

Rebisso, Louis T., an American sculptor; born in Italy, in 1837. Having taken an active part in Mazzini's attempt to establish an Italian republic (see MAZZINI, G.), at the age of 20, he fled from Italy and made his way to Boston, Mass. Subsequently he went to Cincinnati, O., where his fame as an artist developed. His leading works are the equestrian statues of Gen. J. B. McPherson in Washington, D. C.; of Gen. U. S. Grant in Lincoln Park, Chicago, and of Gen. W. H. Harrison in Cincinnati, O. He died in Norwood, a suburb of Cincinnati, O., May 3, 1899.

Rebus ("by things"), a word, name, or phrase represented by the figure of an object which resembles in sound the words, or syllables of the words, indicated; an enig-

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matical representation of words by the use of figures or pictures; thus, a "bolt" and a "tun" represent "Bolton." In heraldry, a device intended to represent a proper name by a picture; a bearing or bearings on a coat of arms, containing an allusion to the name of the owner; as in the coat of the family of Arches, which consists of three arches, two simple and one double, borne on a shield; and that of the Dobell family, who bore on a sable shield a doe passant, between three bells argent.

Récamier, Madame (Jeanne Françoise Julie Adélaïde Bernard), a famous French-woman; born in Lyons, France, Dec. 4, 1777. She grew up a girl of remarkable grace and beauty, and at 15 was married to M. Jacques Récamier, a rich banker about thrice her own age. Her salon was soon filled with the brightest wits of the literary and political circles of the day, but fortunately for herself Madame Récamier possessed a temperament that saved her from temptation and almost scandal. For Madame de Staël she had a warm affection that survived the exile required by the jealousy of Napoleon. Soon after this her husband was completely ruined, and Madame Récamier visited Madame de Staël at Coppet in Switzerland (1806). Here she met Prince August of Prussia, who alone of all her innumerable admirers is supposed to have touched her heart. Indeed a marriage was arranged, provided M. Récamier would consent to a divorce. The good man did not refuse, but his kindness was too much for the generous heart of Madame Récamier, who declared she could not leave him in his adversity. The most distinguished friend of her later years was M. de Châteaubriand. In 1846 he became a widower, and he then wished to marry Madame Récamier, whose husband had been dead since 1830, but the lady declined the honor without interrupting the current of their friendship. Châteaubriand died July 4, 1848, and she followed him to the grave May 11, 1849. Her "Recollections and Correspondence" were edited by her niece, Madame Lenormant in 1859.

Recanati, a town of Italy, 15 miles S. of Ancona; has a Gothic cathedral with a monument to Pope Gregory XII. Here Leopardi was born. Porto Recanati is 6 miles N. E. on the Adriatic coast.

Recaption, in law, recaption or reprisal is another species of remedy by the mere act of the party injured. This happens when any one has deprived another of his property in goods or chattels personal, or wrongfully detains one's wife, child, or servant; in which case the owner of the goods, and the husband, parent, or master, may lawfully claim and retake them, wherever he happens to find them; so it be not in a riotous manner, or attended with a breach of the peace.

Receipt

Receipt, a written document, declaring that certain goods or a sum of money have been received. When made out in full, a receipt should contain (1) the date when the merchandise or money was received, (2) the name of the person or firm from whom received, (3) the name of the person who received it, and (4) for what the money is paid or deposited. A receipt may be in full or in part payment of an account, and operates accordingly. A receipt, though evidence of payment, is not absolute proof, and this evidence may be rebutted by proving that it was given under misapprehension.

Receiver, a person specially appointed by a court of justice to receive the rents and profits of land, or the produce of other property, which is in dispute in a cause in that court. The name is also given to a person appointed in suits concerning the estates of infants, or against executors, or between partners in business, or insolvents, for the purpose of winding up the concern.

Receiver of Stolen Goods, one who takes stolen goods from a thief, knowing them to be stolen, and incurs the guilt of partaking in the crime. If the theft amounts to felony the punishment is penal servitude from 3 to 14 years, or imprisonment for two years; if a misdemeanor, penal servitude from three to seven years, or imprisonment for not above two years. In the United States the penalty is fixed by statutes in the several States.

Recent, in geology, a term applied to a division of the post-Tertiary in which all the mammalia, as well as all the shells, are identical with living species. In certain places it is difficult to draw a distinction between the Recent and the Pleistocene deposits. Alluvium brought down by rivers, modern peat, the Clyde marine strata with canoes, the kitchen middens of Denmark, and the lake dwellings of Switzerland belong to the Recent period.

Receptacle, in botany: (1) Any part which supports another part. The receptacle of a flower is the top of the peduncle on which the flowers are inserted. It may be a flattened area, or a vanishing point, or may be greatly dilated. The receptacle of a fruit is its torus. The receptacle of an ovule is the placenta. The receptacle of the sporangia in a fern is the vein passing through their axis. (2) A cavity for the reception of any substance. The receptacle of oil is one of the cysts which contain it, as, for instance, those on the rind of the orange.

Rechabite, a member of a section of the Kenites, called in Hebrew *rechabim*, from Rechab (=the horseman; *rachab*=to ride); the father of Jonadab, who enjoined his descendants to abstain from wine, from building houses, sowing seed, and planting vineyards, and commanded them to dwell in tents (Jer. xxxv: 2-19). Wolff mentions

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an interview he had with a nomadic Jew near Senaa, who claimed to be a descendant of Jonadab, stating that his tribe were 60,000 in number, and adhered to their ancient laws, and that they were a living fulfillment of the prophecy of Jer. (xxxv: 19). Hence, one who abstains from alcoholic beverages; a teetotaler. Also a member of the Independent Order of Rechabites, a friendly society founded on temperance principles, "so that abstainers could be united together, and have the privileges of a benefit society as well." The first meeting was held at the Temperance Hotel, Bolton street, Salford, Lancaster, England, Aug. 25, 1835. The Rechabite pledge is extremely stringent and far-reaching, but the order is steadily increasing in Great Britain, and has been introduced into the United States, Canada, and Australia. Their lodges are called "tents" in allusion to Jer. xxxv: 7. The total number of members in the United States Jan. 1, 1901, was 2,500; in the world, 264,000. The benefits disbursed in the fiscal year of 1900 amounted to \$3,400 in the United States; to \$765,225 in the world.

Recidivists, in France, the habitual criminals. In 1883-1884 the French government proposed to send them to New Caledonia, giving them a certain measure of freedom; but against this proposal the Australian colonies protested most vigorously. See NEW CALEDONIA.

Reciprocal, in grammar, reflexive. Applied to verbs which have as an object a pronoun standing for the subject; as, "Be-think yourself." It is also applied to pronouns of this class. As a noun, that which is reciprocal to another thing. Specifically, in mathematics, the quotient resulting from the division of unity by the quantity; thus

the reciprocal of a is $\frac{1}{a}$, of 2 is $\frac{1}{2}$, of $a + b$

is $\frac{1}{a + b}$, etc. The product of a quantity, and

its reciprocal, is always equal to 1. The reciprocal of a vulgar fraction is the denominator divided by the numerator; thus the reciprocal of $\frac{1}{2}$ is 2, of $\frac{2}{3}$ is $\frac{3}{2}$, etc.

Reciprocating Engine, the common form of engine, in which the piston and piston-rod move backward and forward in a straight line, absolutely or relatively to the cylinder, as in oscillating-cylinder engines. The term is used in contradistinction to rotary engines.

Reciprocity, the quality or state of being reciprocal; specifically, reciprocal obligation or right; equal rights to be mutually granted and enjoyed, as, in political economy, the securing in commercial treaties between two or more nations mutual advantages to the same extent, *e. g.*, the admission, mutually, of certain goods, supposed

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to be practically equivalent to each other, duty free, or at equal duties on importation. Law of reciprocity: in mathematics, a term employed by Legendre in his "Theory of Numbers," to express a certain relation that exists between the remainders resulting from

dividing $\frac{n-1}{2}$ by n , and $\frac{m-1}{2}$ by m , when m

and n are prime. If we designate the remainder in the first case by R , and in the second by R' , then, when m and n are both of the form $4a-1$, $R'=-R$, and in all other cases $R=R'$

Reciprocity Treaty, a treaty made between two countries for the purpose of regulating trade between them. The United States has entered into a number of such compacts, and the tariff bill of 1897 provided for the appointment of a special commissioner to negotiate such treaties. John A. Kasson was the first commissioner.

Recitative, in music, a species of musical declamation, not necessarily in rhythmic form, but so arranged or designed as to assimilate musical sounds as nearly as possible to ordinary speech. It is used in operas, oratorios, etc., to relate a story, to express some action or passion, or to reveal a secret or design, and is of two kinds, unaccompanied and accompanied, the latter being the more common in modern music. Also, a piece of music intended to be sung in recitative.

Recke, Ernst von der, a Danish romantic poet; born in Copenhagen, Denmark, Aug. 14, 1848. His earliest and most popular poem is the three-act drama "Bertran of Born" (1872). He wrote much on the art of Danish verse, including "Principles of Danish Versification as Manifested in its Historic and Systematic Development" (1881); and "The Rules of Danish Versification Concisely Stated" (1885). Among his other publications are: "Lyric Poems" (1876); "King Liuvigild and his Sons," a tragedy (1878); "Archilochus" (1878); "Knud and Magnus," a tragedy (1881); "Short Poems" (1883); "Miscellaneous Poems" (1890); "Fru Jeanna," a tragic opera (1891); and "The Duchess of Burgundy" (1891).

Reclus, Jean Jacques Elisée, a French geographer; born in Sainte-Foix la Grande, France, March 15, 1830. He was educated at Montauban and under Carl Ritter at Berlin. In consequence of his extreme democratic views he left France after the coup d'état, of 1851, and spent the next seven years in England, Ireland, North and Central America, and Colombia. He returned to Paris in 1858, and published "Journey to the Sierra Nevada of Sainte Marthe" (1861), and an introduction to the "Dictionary of the Communes of France"

Reconcentrado

(1864). For being concerned in the Communistic outbreak of 1871 he was banished from France, but returned under an amnesty in 1879. While living in exile in Switzerland he began his great masterpiece, "New General Geography" (14 vols. 1876-1889). Reclus was also the author of another great work, a physical geography entitled "The Earth" (2 vols. 1867-1868; Eng. trans. 1871 and 1887); besides "Terrestrial Phenomena" (1873) and "History of a Mountain" (1880). He died July 4, 1905.

Recognizance, or Recognisance, in law, an obligation of record, which a man enters into before some court of record or magistrate duly authorized, with condition to do some particular act; as, to keep the peace, to pay a debt, or the like. It is in most respects like any other bond, the form of it being, "that A B doth acknowledge to owe to our lady the queen, to the plaintiff, to C D, or the like, the sum of 10 pounds," with condition to be void on performance of the thing stipulated. Also the verdict of a jury impaneled upon assize.

Recollet, or Recollect, Friars or Nuns, the name given to a reformed body of Franciscans. The society was founded in Spain, and thence spread throughout Europe, so that in France, before the Revolution, they had 168 houses. The order still exists at a few places.

Reconcentrado (Spanish), one of a class of Cubans during the final Cuban rebellion against Spain. Governor-General Weyler issued a decree that all of the peasant class not actively engaged in the insurrection but at their homes or ranches, should be "reconcentrated" in or near certain towns, disobedience to this decree incurring the penalty of death. Accordingly, these people who were "raising bread" and "getting a living" on their "farms," non-combatants and mostly old men beyond the ability of army service, feeble old women, children, and babies, were forced to leave their homes and to gather in herds in and near these towns, where they were without food and shelter, "reconcentrated," to starve and to suffer from exposure to the weather and lack of all comfort. These helpless victims of "a measure" and the "fortune" of war were popularly called "reconcentrados." General Weyler's purpose in this "measure of war" was to desolate the island in certain parts so that the "insurgents" could not get aid and food. With this end in view, the abandoned homes were destroyed and whatever remained of value to the Spaniards was confiscated. Whole districts in the most productive part of the island were thus laid waste. Sugar mills were burned and other industrial property was destroyed. Nearly 400,000 "reconcentrados" were forced to go within the Spanish lines, where no means of subsistence were provided for

them. More than 200,000 died of starvation and disease, an appalling record in modern civilization.

The United States was shocked by this atrocity, and at this time could give but little aid to the sufferers, their undertakings, including the Red Cross work, being barred out or limited by Spanish authority. Later this American work of "rescue in Cuba" was largely effective for this most unfortunate class. When the decree, under General Blanco, was issued to permit the reconcentrados to return to their homes, there was but desolation where their homes had been. It was at this time that the American relief work, Red Cross ministrations, and other help availed this helpless class, but not to the full extent of their capacities till the American army and navy had conquered Spanish rule in the "Pearl of the Antilles."

Reconnaissance, the act or process of reconnoitering; a preliminary survey or examination; specifically applied to: (1) The examination of a territory, district, etc., or of an enemy's position, for the purpose of directing military operations. (2) The examination or survey of a region in reference to its general geological character. (3) A preliminary examination of a county or district in reference to its general natural character, preparatory to a more particular survey for the purposes of triangulation or the construction of public works, as of a road, canal, railway, etc.

Reconstruction, in United States history, a making-over of the political fabric of the States that composed the Southern Confederacy. At the close of the Civil War, these States were practically without governments, those which they had established after their withdrawal from the Union having been overthrown. They had been declared insurgents and therefore their relation to the United States government was that of a conquered territory.

The treatment of these States became a problem. Plans for the solution were submitted which may be classified as follows: (1) The theory that as soon as the bare number of Union men who had always been in these States, had established a loyal government, the States would then be regularly reconstituted. (2) The theory in President Lincoln's proclamation of Dec. 8, 1863, stipulating that if after having taken a prescribed oath of allegiance, one-tenth of the number of voters of 1860 should establish a loyal government it should be recognized, this stipulation applying to all such governments; the theory including a provision of amnesty on certain conditions for all, with the exception of a specified portion of those in rebellion. (3) Sumner's theory that a State renounces its State rights through

the act of withdrawal, and in doing so abolishes a right to slavery which is an institution based merely on State authority; that Congress should institute measures to establish this conclusion as a fact, and also to protect all the inhabitants of the State, and therein to set up a republican form of government. (4) Thaddeus Stevens' theory that insuperable resistance to the Constitution suspends its operations and that it then becomes incumbent on the National government to decide when it is to be resumed. (5) The Davis-Wade theory introduced by Henry Winter Davis and Benjamin F. Wade, from the "Committee on Rebellious States." This theory made provisions for the appointment of provisional governors, the emolument of citizens ready and willing to take the oath of allegiance, the approval and adoption of a constitution, and recognition of the State by admission. (6) The congressional theory which was really carried into effect.

Measures radically discriminating against the negroes had been adopted by the Legislatures reconstructed under the proclamation of Dec. 8, 1863. This had excited and united Republican feeling in the North against the President's policy. Meantime President Lincoln had been assassinated and Vice-President Johnson had taken the presidential chair. When Congress assembled, in December, 1865, Republican opposition was manifest in an enactment that no State should be represented in either House till Congress had declared its right to representation. A bill was passed proposing the Fourteenth Amendment to the National Constitution, and declaring the right of representation to any States ratifying. The Civil-Rights Bill followed, and the bill enlarging the provisions of the freedman's bureau, were passed over the President's veto. According to Congress, the Constitution of the United States retained the authority vested in it over States which through their act of withdrawal, had suspended their State governments, since those States were not viewed as "destroyed," but as being in a position for restoration to "their former political relations" in the Union, by consent of the law-making power of the United States.

The Republicans were divided in their policy, one faction sustaining the President in his opinions, the other faction being resolute in the feeling that adherence to his opinions was treason to the party. Some indiscreet speeches made by President Johnson during a trip through some Northern and Western States accentuated Republican opposition to his policy. Congress then passed a series of laws, some of them over the President's veto. Among these were the Tenure of Office Act, establishment of universal suffrage in the territories, ad-

mission of Nebraska into the Union, and making General Grant irremovable as head of the army. Meantime, but one State, Tennessee, had been admitted, July 24, 1866, none of the others adopted the Fourteenth Amendment. In view of the situation, Congress divided the South into five military districts. A military governor was appointed for each district, and he was empowered to protect life and property through local courts or military commissions. Each governor was to supervise the election of delegates to a constitutional convention to which all but certain disqualified classes were to be admitted, such delegates to be elected by those eligible to vote. It was provided that such constitutions should be ratified by a popular vote, and then placed before Congress; the next measure to be a ratification of the Fourteenth Amendment by the new Legislature so including the amendment in the State constitution, which act should entitle the State to representation in Congress. The bill with such provisions was passed over the President's veto, March 2, 1867. The provisions of the bill were carried out, and the constitutions which were adopted abolished slavery, renounced the right of secession, and agreed to pass no laws limiting the liberty of any class of citizens and repudiated the debts incurred during the Civil War. Governors and legislators were elected under these constitutions. Arkansas was admitted June 22, 1868; North Carolina, South Carolina, Georgia, Florida, Alabama, and Louisiana, June 28, 1868; Virginia, Jan. 26, 1870; Mississippi, Feb. 23, 1870; Texas, March 30, 1870. Congress did not complete the readmission of Georgia till July 15, 1870, that State having failed in its compliance with the general policy. The four States last named were compelled to ratify the Fifteenth Amendment, also before their admission, as a penalty for delay in complying with the plan of Congress. The Union of the United States was thus restored, and the Supreme Court of the United States in the case of *Texas vs. White* declared the action of Congress constitutional.

Record, the list of known facts in a person's life, especially in that of a public man; personal history. Also something set down in writing for the purpose of preserving the memory of a fact or event; specifically a register; an authentic or official copy of a document, or account of any facts, acts, or proceedings, whether public or private, entered in a book for preservation; also, the book containing such entries. In law, authentic or official testimonies in writing, contained in rolls of parchment, and preserved in a court of record. Congressional Record, a pamphlet published

daily during sessions of Congress and containing a record of the proceedings of that body. Conveyances by record, in law, conveyance evidenced by the authority of a court of record, as a conveyance by private act of Legislature or a government grant. Court of record, in law, a court of record is defined to be that where the acts and judicial proceedings are enrolled or recorded; which rolls are called the records of the court, and are of such high authority that their truth is not to be called in question. Nothing can be averred against the record nor shall any plea, or even proof, be admitted to the contrary. And if the existence of a record be denied, it shall be tried by nothing but itself; that is, upon bare inspection whether there be any such record or no; else there will be no end of disputes. Debt of record, in law, a debt which appears to be due by the evidence of a court of record. Geological record, the record of the history of the globe, as written upon the rocks, especially by means of fossils. It is imperfect; many gaps existing, some of which may never be filled up. To beat, break, or cut the record, in sporting concerns, to do a distance in less time than has yet been officially recorded, to excel any previous performance. Trial by record, in law, a trial which is heard when a matter of record is pleaded.

Recorder, Robert, an English mathematician; born about 1500 in Tenby, Pembrokeshire, Wales. He was educated at Oxford, but wishing to make medicine his profession, removed to Cambridge, where in 1545 he received the degree of M. D. In 1547 he was in London, engaged in the composition of "The Urinal of Physic" (1548) and was about the same time appointed physician to Edward VI., as afterward to Queen Mary. His works are all in the form of dialogues between a master and his pupil, and are written in the rude English of his time; they are "The Grounde of Artes, teaching the Perfect Woork and Practice of Arithmeticke" (1543); "The Pathwaye to Knowledge" (1661); abridgement of Euclid's "Elements"; "The Castle of Knowledge, Containing the Explication of the Sphere both Celestial and Material," (1551), an astronomical work, in which he compares the Ptolemaic and Copernican systems; "The Whetstone of Wit" (1557), a treatise upon algebra. In the appreciation of the general results derivable from algebraic formulæ he is far beyond his contemporaries, with the sole exception of Vieta. He died in the debtors' prison in London, in 1558.

Recorder, in England, the chief judicial officer of a borough or city, exercising within it, in criminal matters, the jurisdiction of a court of record, whence his title is

derived. The appointment of recorders is vested in the crown, and the selection is confined to barristers of five years' standing. The same name is given to similar legal functionaries elsewhere, as in some American cities.

Recorder, a musical instrument, formerly popular in Great Britain, resembling a flageolet in shape. The instrument was wider in the lower half than in the upper; its tones were soft and pleasing, and an octave higher than the flute.

Recording and Registering Machines, devices that make a permanent record of events, dates and numbers. A large number of contrivances have been invented for registering and recording in the shortest time and with the least possible work. In the proper use of the discriminating word, a recording contrivance leaves a record in printing or tracing that can be preserved, while a registering device performs an action that makes figures or words for certain purposes.

A simple mechanism for registering figures is composed of gear-wheels numbered from 0 to 9. These wheels are in a row with gearing by means of which the first wheel turns the second one-tenth in a rotation, the second acting upon the third, and the third upon the fourth, and so on through the row in the same proportionate speed. A common form of this kind of a device is a fare indicator used on street cars. Another is a machine for numbering the pages of blank books, the figure-wheels having a printing face. Intricate devices calculate operations, a notable example of which is the larger cash register, making an accurate account, in detail, so that the entire cash business for the day can be readily balanced in a short time.

An ordinary recorder has a cylinder geared to rotate slowly round its axis while it also advances endwise. This principal is used in the steam-engine indicator and in a large number of scientific mechanisms, the phonographic instrument which records sound waves being a conspicuous example. In many machines the record is taken and preserved by means of a continuous paper-tape which is strung from one reel to another. The stock ticker and the telegraph recorder are types of this kind. Many recorders are constructed in the form of a disk and with radiating graduations. On the disk is a pointer that records the time, as exemplified by a "watchman's detector," and the disk much used for taking the varying pressures of gas. Among the many and various devices both for recording and registering are some provided with keys that make impressions in response to a touch of the fingers or to the touch of an automatic mechanical device.

Recreative Religionists, an association formed in England in December, 1866, for giving popular scientific lectures on Sunday evenings, sacred music being performed at intervals. A prosecution which took place under the Sunday Act, of George III., failed of effect. The Recreative Religionists have for some years figured in the registrar-general's returns of sects, having registered places of worship.

Rectangle, in geometry, a parallelogram or quadrilateral figure whose angles are all right angles. An equilateral rectangle is a square. A rectangle is said to be contained by any two of the sides about one of its angles; thus, if AB and BC represent two adjacent sides, the rectangle is said to be contained by AB and BC , or, as it is sometimes expressed, it is the rectangle under AB and BC . The area of a rectangle is equal to the product of its base and altitude. Rectangles having equal bases are to each other as their altitudes; rectangles having equal altitudes, are to each other as their bases.

Rectify, to refine or purify spirit or common alcohol by a process of distillation, with the aid of certain herbs, essences, and other flavoring ingredients. More strictly, to separate the lighter portions of any liquid, and render pure and homogeneous any alcohol, ether, or volatile oil, by repeated distillation. In geometry, to construct a straight line equal in length to a definite portion of. (Said of a curve.) To rectify the globe in astronomy or geometry, to bring the sun's place in the ecliptic on the globe to the brass meridian, or to adjust it in order to prepare it for the solution of a proposed problem.

Rector, in the Established Church of England a clergyman who has the cure of a parish, and has the parsonage and tithes; the clergyman of a parish where the tithes are not inappropriate, as distinguished from a vicar. In the Roman Catholic Church, the head of a religious house; among the Jesuits, the head of a house that is a seminary or college. Also the principal of a university in France and Scotland, also the heads of Exeter and Lincoln Colleges, Oxford. In Scotland the headmaster of an academy, or important public school.

Rectum, in anatomy, the lowest portion of the large intestine extending from the sigmoid flexure of the colon to the anus.

Recurring Series, in algebra, a series in which each term is equal to the algebraic sum of the products obtained by multiplying one or more of the preceding terms by certain fixed quantities. These quantities, taken in their order are called the scale of the series.

Recusant, one who is obstinate in refusing; one who will not conform to general

opinion or practice. In English history, one who refused to acknowledge the sovereign's supremacy, or who refused or neglected to attend divine service in the Established Church, and to worship according to its forms and rites. It differed from a non-conformist in that it included popish recusants.

Red, a color resembling that of arterial blood; the color of that part of the solar spectrum which is farthest from violet; one of the three primary colors. Mixed in equal strength and proportion with the other primaries, it yields secondaries, *e. g.*, with yellow it forms orange; with blue, violet, etc. Also a pigment. The most useful red pigments are carmine, vermilion (sulphuret of mercury), chrome-red, scarlet-lake (biniodide of mercury), madder-lake, light red, burnt sienna; these are yellow reds. Venetian red, Indian red (carbonate of oxide of iron), and crimson-lake are blue reds. Reds are derived from the three kingdoms of nature, carmine being derived from the cochineal insect, the lakes and madders from the vegetable world, and the others from the mineral world.

Red Admiral Butterfly (*Vanessa Atalanta*), the popular name of a common butterfly. The anterior wings are marked by a broad red band, outside of which are six white markings, while a bluish streak follows the wing margin. The posterior wings are bordered with red, dotted with black spots, and have two bluish markings on the inner angles.

Redan, in fortifications, a work having two faces forming a salient angle in the direction from which an attack may be expected. It is open at the gorge. A double redan has a reëntering angle for mutual defense. The redan is the simplest field work, and is used for defending the avenues of approach to a village, bridge, or defile. In front of another field work, it is called a *fièche*. When flanks are added to the faces, the work becomes a detached bastion or lunette.

Redan, The, one of the strongest Russian fortifications on the S. side of Sebastopol. It was unsuccessfully assaulted by the English on June 5 and Sept. 8, 1855. The retirement of the Russians to the N. side left, on the latter date, the place in the hands of the allies.

Red and White Roses, Wars of the. See ROSES, WARS OF THE.

Red Bank, a town in Monmouth co., N. J., on the Shrewsbury river, and on the Pennsylvania and Central of New Jersey railroads; 26 miles S. of New York. The town has regular steamboat connection with New York. Here are a public library, high school, National banks, and weekly newspa-

pers. There is a considerable trade in fish and oysters. The town has manufactories of gold-leaf, carriage, and canned goods, and an assessed property valuation of nearly \$3,000,000. Pop. (1890) 4,145; (1900) 5,428; (1910) 7,398.

Red Bat, in zoölogy, *Atalapha novæboracensis*, from the temperate parts of North America. Length about two inches; fur long and silky, generally light russet, tinged with yellow, darker and richer on the back.

Red-billed Curlew, in ornithology, *Ibidorhynchus struthersi*, found only in the Himalaya Mountains and the hills of Central Asia. It is nowhere common, and generally seen singly, but occasionally met with in groups of five or six.

Red Book, an English government book containing the names of all persons in the service of the State. The red book of the exchequer is an ancient record in which are registered the names of all that held lands *per baroniam* in the time of Henry II.

Redbird, the popular name of several birds in the United States, as the *Tanagra æstiva* or summer red bird, the *Tanagra rubra*, and the Baltimore oriole or hang nest.

Redbreast, Robin. See ROBIN.

Red Brocket, in zoölogy, the *Cervus rufus* or *Subulo rufus*. It is about 30 inches high, reddish-brown, with simple, unbranched antlers; females hornless. Habitat, the low, moist woods of South America.

Red Cedar, a species of juniper (*Juniperus virginiana*) found in North America and the West Indies; the heartwood is of a bright red, smooth, and moderately soft, and is in much request for the outsides of black lead pencils.

Red Chalk. See REDDLE.

Red Coral (*Corallium rubrum*), an important genus of sclerobasic corals belonging to the order *Alcyonaria*. Red coral is highly valued for the manufacture of jewelry, and is obtained from the coasts of Sicily, Italy, and other parts of the Mediterranean.

Red Cross Society, an international organization for the protection and care of the sick and wounded in war and for the care of sufferers from other large calamities. The organization is the result of an international treaty entered into by most of the leading nations at a convention held at Geneva, Switzerland. This treaty sustains the neutrality of Red Cross Societies in all countries and on all waters covered by the compact, and insures to it the protection of all conflicting forces in time of war. The original treaty covered all suffering caused by war; but to-day the Red Cross cares for the victims of pestilence, flood, and

Red Cross Society

fire as well as for the victims of war. The symbol that the service carries is a tribute to Switzerland as the birth-land of the movement. Switzerland's national flag is a white Greek cross on a red ground. In the Red Cross flag the colors are simply reversed. In each country that adopted the treaty a national organization has been formed, and that society alone is recognized by its national government, by other governments, by other national organizations, and by an international committee located in Geneva. This Geneva committee is the medium of communication and assistance between nations, conducing much to harmony.

The honor of conceiving the ideas that resulted in the first practical inception of the Red Cross service belongs to Henri Dunant, a French humanitarian. The first practical inception of his purpose was made by the Geneva Society of Public Utility. They interested the officials of the Swiss government and with General Dufour, Commander-in-Chief of the Swiss army, as its leader, a committee was appointed, Feb. 9, 1863, to give impetus to the movement. The labors of the committee resulted in a formal international conference in October, 1863, and a final convention in August, 1864. In 1906 representatives of 37 nations met in Geneva and revised the International Red Cross Treaty, and the new compact was officially accepted and proclaimed by the President of the United States on Aug. 3, 1907.

The AMERICAN NATIONAL RED CROSS was originally incorporated under the laws of the District of Columbia in 1881; was reincorporated so as to cover the relief of suffering by war, pestilence, famine, flood, fire, and other calamities of sufficient magnitude to be deemed national in extent, in 1893; and, after a thorough reorganization, was incorporated by Congress in 1905, and made a distinctive part of the National Government. In its new form William H. Taft, then Secretary of War, became its president. Brig.-Gen. Robert M. O'Reilly, Rear-Admiral Presley M. Rixey, and Dr. Walter Wyman, the surgeon-generals respectively of the army, navy, and U. S. Public Health and Marine Hospital Service, were constituted a board of consultation.

Red Cross, The Royal, a decoration instituted by Queen Victoria in 1883. It is conferred on any ladies, English or foreign, recommended by the Secretary of State for War, for special exertions in providing for the nursing, or for attending to sick and wounded soldiers and sailors. The decoration is a cross of crimson enamel gold-edged, attached to a dark-blue ribbon red-edged, one inch in width, tied in a bow and worn on the left shoulder.

Red Currant (*Ribes rubrum*), a deciduous shrub much cultivated for its fruit, indigenous in the N. portions of Europe and

Redemptorists

America. The juice of the fruit is used for making jelly, and a well-known fermented liquor called currant wine.

Red Deer. See STAG.

Reddendo, in law, the technical name of a clause indispensable to an original charter, and usually inserted in charters by progress. It takes its name from the first word of the clause in the Latin charter, *Reddendo inde annuatim*; and it specifies the feu-duty and other services which have been stipulated to be paid or performed by the vassal to his superior.

Reddle, Raddle, Ruddle, or Red Chalk, a species of argillaceous ironstone ore. It occurs in opaque masses, having a compact texture. It is used as a pigment of a florid color, but not of a deep red. Sheep are generally marked with it.

Red Earth, the name given to the reddish loam or earth which so frequently occurs in regions composed of limestones. This earth is the insoluble residue of those portions of the calcareous rock which have been dissolved by rain. Such red earths are of common occurrence in limestone caverns.

Redeemable Rights, in law, those conveyances in property or in security which contain a clause whereby the grantor, or any other person therein named, may, on payment of a certain sum, redeem the lands or subjects conveyed.

Redemption, in commerce, repurchase by the issuer of notes, bills, bonds, or other evidence of debt, by paying their value in money to the holders. In law, the liberation or freeing of an estate from a mortgage; the repurchase of the right to reënter upon an estate on performance of the terms or conditions on which it was conveyed; the right of redeeming and reëntering into possession. In theology, ransoming. The ransom of sinners from the curse of the law, *i. e.*, from the penalties of the violated law of God (Gal. iii: 3), effected through "the blood of Christ," *i. e.*, through His atoning sacrifice (Rom. iii: 24; Eph. i: 7; Col. i: 14; also I Pet. i: 18, 19; Rev. v: 9. With this is conjoined ransom from the domination of sin and Satan (Col. i: 13, 14; I Peter i: 18, 19).

Redemptionists, one of the names of an order of monks devoted to the redemption of Christian captives from slavery. They are more frequently called Trinitarians.

Redemptorists, members of the Congregation of the Most Holy Redeemer, founded by St. Alphonsus Maria de Liguori (1696-1787), at Scala, in 1732. The Institute was approved in 1749 by Pope Benedict XIV., who changed its original title—the Congregation of the Most Holy Saviour—to that by which it is now known. The mem-

Redemptoristine

bers take the three simple, but perpetual, vows, and a fourth, of perseverance in the Institute till death. Their principal object is the preaching of missions and retreats to all classes of Roman Catholics, giving preference to the ignorant and neglected. Their dress is a black serge cosack, with cloth girdle and rosary beads. It is substantially the dress worn by the secular clergy in Naples in the first half of the 18th century.

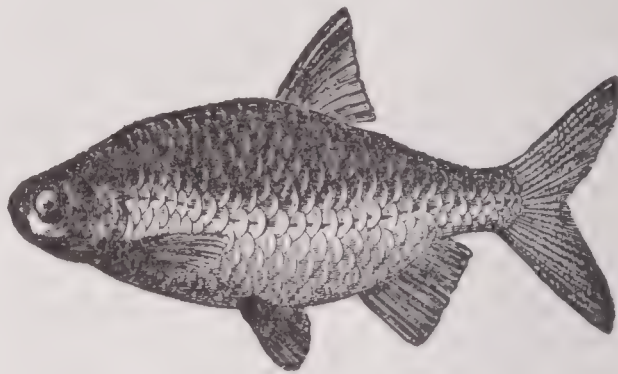
Redemptoristine, an order of nuns, constituting the Order of the Most Holy Redeemer, founded by St. Alphonsus Maria de Liguori (1696-1787). They are strictly inclosed, contemplative, subject to the jurisdiction of the bishop of the diocese in which they reside, and assist the missionaries of the congregation by their prayers. The Redemptoristines wear a red habit, with a blue scapular, and white shoes.

Redesdale, the valley of the river Reed in Northumberland, England; extending almost from the Scottish border in a S. E. direction for over 16 miles, till it opens up into the valley of the Tyne, the river joining the North Tyne at Reeds mouth. It is for miles a mere mountain vale, sloping upward into bleak and dreary moorland, but it has a quiet beauty of its own that is not easily forgotten by the traveler. The river springs out of the Cheviot Hills, which lie athwart the head of the dale, and down its course from Carter Toll on the border lay one of the chief roads into England. Watling Street itself traverses its middle and upper part. Near the S. end of Redesdale is the famous field of Otterburn, but 16 miles from the border, which point again is but 10 miles from Jedburgh. The men of Redesdale of old were brave and turbulent, and bore more than their share in border feuds and forays. Redesdale gave from 1877 the title of earl to John Thomas Freeman Mitford (1805-1886), who was son of the ex-speaker, John Mitford (died 1830), first Baron Redesdale, and who himself from 1851 was chairman of committees in the House of Lords, and a determined enemy of change in ecclesiastical matters.

Redeswire, Raid of the, a battle fought July 8, 1575, close to the English border at the pass leading across the Cheviots into Redesdale, about 6 miles E. S. E. of Chesters in Roxburghshire. A number of Scotch attacked an English force to avenge the slaughter of a countryman, but were beaten back and on the point of being utterly routed, when the provost and townsmen of Jedburgh arrived hot from 10 miles' march, and at once set on the enemy. The Englishmen were soon completely defeated, with the loss of several considerable prisoners. There is a prosy ballad on the subject in Scott's "Border Minstrelsy."

Redgrave

Red-eye, or Rudd, a fish belonging to the same genus as roach, chub, and minnow. Is common in lakes, slow rivers, and



RED-EYE OR RUDD.

fens, in many parts of Europe and in England. It much resembles the roach, but is shorter and deeper. It is richly colored, the name rudd referring to the color of the fins, the name red-eye to that of its iris. The fish is better eating than the roach, and sometimes attains a weight of two pounds.

Redfield, Isaac Fletcher, an American jurist; born in Wethersfield, Vt., April 10, 1804; was graduated at Dartmouth College in 1825; and practised his profession in Windsor and Derby, Vt. In 1835, he was made judge of the Supreme Court of Vermont, and in 1852 became chief-justice, retiring from the bench in 1860. He was Professor of Jurisprudence at Dartmouth College in 1857-1861; removed to Boston in the latter year; and in 1867-1869 was special counsel for the United States in Europe, conducting numerous important legal matters in England and France. He was the author of "A Practical Treatise on the Law of Railways" (1857); "A Practical Treatise on Civil Pleading and Practice, with Forms" (with William A. Herrick, 1868); "The Law of Carriers and Bailments" (1869); etc. He died in Charlestown, Mass., March 23, 1876.

Red Fish, a species of fish (*Sebastes marinus*) found on the Atlantic coast of North America, a large red fish caught in considerable numbers for food. A smaller species (*S. viviparus*) receives the same name, and is called also red perch, rose fish, etc.

Redgrave, Richard, an English painter; born in London, April 30, 1804; in 1826 was admitted a student of the Academy, and was elected an A. R. A. in 1840, an R. A. in 1851. From 1847 he took a prominent part in art instruction, and in 1857 was appointed Inspector-General of Art Schools, which office, with that of Surveyor of the Royal Pictures, he resigned in 1880, being then created a C. B. In 1882 he was placed on the list of retired academicians, and next year he ceased to exhibit, having since 1825 contributed 145 pictures to the Academy, besides 40 sent elsewhere. He wrote, with

Redgum

his brother, "A Century of English Painters" (1866), and edited several valuable catalogues. He died Dec. 14, 1888.

Redgum, strophulus; a papular disease with an eruption of minute hard, sometimes slightly red, clustered or scattered pimples on the face, the neck, or even the whole body of young infants. Cause, derangement of the stomach or intestines through improper feeding or from dentition.

Red Jacket, or, as he was termed by the Indians, SA-GO-YE-WAT-HA, a chief of the Senecas, of the Wolf tribe; born near the present site of Buffalo in 1752. His original name was O-TE-TI-ANI (Always Ready), his other name being conferred on him when he was elected to the dignity of a sachem, and means, "He keeps them awake." His name of Red Jacket was conferred on him on account of his high appreciation for a finely embroidered scarlet coat which he constantly wore and which had been a gift from a British officer. He was a fluent talker and had much influence over his people. He first became known through the part he took in the treaty of Fort Stanwix in 1784. A council had been called to negotiate between the United States and the Six Nations for the cession of lands, and on the occasion he spoke eloquently against the proposed treaty, but without avail. In all his dealings with the whites in regard to land, Red Jacket was a strenuous defender of the rights of the Indians. His paganism never yielded to the influences of Christianity and he proved an inveterate enemy of the missionaries. Under his leadership the Senecas joined the Americans in the War of 1812 and in the battle of Chippewa behaved well as soldiers. In 1792 Washington, on the occasion of a treaty of peace having been signed between the United States and the Six Nations, gave Red Jacket a solid silver medal, which the Indian wore with much satisfaction. As he grew old he grew grossly intemperate, but always abstained from drinking for a season before any council. On account of his intemperance he was deposed as chief of the tribe, the act being signed by 26 of the leading men among the Senecas. He died Jan. 20, 1830. Red Jacket was on the warpath during both conflicts between the United States and Great Britain, but he never attained the dignity of wearing the eagle plume. He had great sagacity as a statesman, but lacked firmness of nerve. His intellectual powers were of a very high order, but he was capable of practising the lowest cunning. His bones were removed from their resting place and reinterred in Buffalo, N. Y.

Red Men, Improved Order of, a social, fraternal, and benevolent secret organization founded on the customs and traditions of the aborigines of the American continent, and the oldest benevolent society in the United States of distinctively Amer-

Redmond

ican origin and growth. The first authenticated Red Man's Society was organized in Philadelphia, Pa., early in 1772. Societies of like nature were formed in New York and other cities, but finally disbanded or drifted away from their original intention, till in 1813 a number of soldiers stationed at Fort Mifflin, near Philadelphia, united in a society of Red Men—the forerunner of the present order. On March 12, 1834, the "Red Men's Society, Tribe of Maryland," was organized in Baltimore, Md., shortly after (May 20, 1835) forming the Great Council of Maryland, and adopting the present name of the order. The order is composed of subordinate bodies called tribes, officered by a sachem, senior sagamore, junior sagamore, prophet, chief of records, keeper of wampum, and minor sub-chiefs. In each State possessing necessary membership a Great Council is constituted, composed of representatives from the various tribes under its jurisdiction, and officered by similar chiefs to the subordinate tribes, with the prefixed title of great. The Great Council of the United States is the supreme legislative body, and is composed of representatives from each Great Council. There were in 1909, 63 great councils; 4,750, tribes; and 475,450 members. The benefits disbursed in the last fiscal year were \$1,428,789, and since organization, \$24,055,509.

Redmond, John Edward, an Irish politician and leader of the Irish parliamentary party in the British House of Commons; was the eldest son of W. A. Redmond, who sat for Wexford, Ireland, 1872-80. He was born in Dublin in 1851, and was educated at Clongowes Wood College (Jesuit) and Trinity College, Dublin; entered as a law student at Gray's Inn in 1880; called to the English bar in 1886; and to the Irish bar in 1887. He went with his brother William to Australia to appeal to Irishmen there for the support of the Nationalist party, and they married the two daughters of the late John Dalton, a wealthy resident of Sydney, N. S. W. He was M. P. for New Ross, Co. Wexford, from 1881 to 1885, and for North Wexford from 1885 to 1891. He resigned on the death of Parnell to contest Cork city, but was beaten by Mr. Flavian. Two months later he was returned for Waterford, where he was successively re-elected. In 1909 he again became chairman of the Irish Parliamentary Party, and early in 1910, during the excitement in Parliament over the budget, he practically became the leader of the Commons, and a most determined advocate of the abolition of the veto power of the House of Lords. Born and bred in aristocratic surroundings, he became an ardent Home Ruler. He has paid several visits to the United States, making successful appeals for the Home Rule (*q. v.*) cause. Vast crowds flocked to hear him

Red Ochre

in every city where he spoke, and his energetic eloquence and never-failing tact have stood him in as good stead here as in the House of Commons.

Red Ochre, a name common to a variety of pigments, rather than designating an individual color, and comprehending Indian red, light red, Venetian red, scarlet ochre, Indian ochre, reddle, bole, and other oxides of iron. As a mineral it designates a soft earthy variety of hæmatite.

Redondilla, the name given to a species of versification formerly used in the S. of Europe, consisting of a union of verses of four, six, or eight syllables, of which generally the first rhymed with the fourth, and the second with the third. At a later period verses of six and eight syllables, in general in Spanish and Portuguese poetry, were called redondillas, whether they made perfect rhymes or assonances only. These became common in the dramatic poetry of Spain.

Redoubt, in fortification, a detached field work inclosed by a parapet, the salient points of which are but imperfectly or not at all protected by a flank fire. It may be square, star-shaped, or irregular in plan, according to the requirements of its site and surroundings. Also, an interior work within the main line of ramparts.

Redout Kalé, a fortified post on the Black Sea coast of Russian Caucasia; in a marshy region at the mouth of a small river, about 10 miles N. of Poti. It was the chief shipping place for Circassian girls to Turkey, and was captured by the British fleet in 1854.

Redpath, James, an American journalist; born in Berwick, Scotland, Aug. 24, 1833. He was known as a fiery abolitionist, and an ardent supporter of the Irish in the land league troubles. He founded the "Redpath Lyceum Bureau," an agency for lecturers and musicians, in 1867, and conducted it until 1875. He became assistant editor of the "North American Review" in 1886. He published: "Handbook to Kansas" (1859); "The Roving Editor" (1859); "Echoes of Harper's Ferry" (1860); "Southern Notes" (1860); "Guide to Hayti" (1860); "The John Brown Invasion" (1860); "Life of John Brown" (1860); and "Talks About Ireland" (1881). He died Feb. 10, 1891.

Red Pine, a species of pine (*Pinus rubra*), also called Norway pine. Its wood is very resinous and durable, and is much used in house and shipbuilding. It produces turpentine, tar, pitch, resin, and lampblack.

Redpole, or **Redpoll**, in ornithology, a popular name for two species of the genus *Linota*, found both in the United States and in Europe, from the glossy blood red hue of the space from the forehead to be-

Red Root

hind the eyes. The mealy redpole, *L. canescens*, is larger than the lesser redpole, *L. linaria*, of which it has been regarded by some ornithologists as a race or variety.

Red Rain, rain tinged red by cobalt chloride derived from meteoric dust.

Red Republican, an extreme republican; one who is ready to fight for his opinions; so called from the red cap worn by the extreme republicans in the first French Revolution to intimate their manumission from the tyranny of the aristocrats, in imitation of the Roman practice of placing a red Phrygian cap on the head of a slave when manumitted.

Red River, the lowest W. branch of the Mississippi, rises near the E. border of New Mexico, flows E. through Texas, forming the entire S. boundary of Indian Territory, thence S. E. through Arkansas and Louisiana, and enters the Mississippi below lat. 31° N. It is 1,600 miles long, and receives numerous branches, the Washita the most important. It is navigable for seven months to Shreveport (350 miles).

Red River, or **Song-ka**, a large river of Tonking, formed by the junction of the Leteën and Song-shai, the former rising in China, the latter in Laos. It flows S. E., passes Hanoi, and falls by several mouths into the Gulf of Tonkin.

Red River of the North, a navigable river of the United States and Canada, rises in Elbow Lake, Minn., near the sources of the Mississippi, and flows S. and W. to Breckinridge, then N., forming the boundary between Minnesota and North Dakota, and so into Manitoba and through a flat country to Lake Winnipeg. Its course is 665 miles (525 in the United States). The Red River Settlement was the origin of the Canadian province of Manitoba. The soil of the Red River Valley is a vegetable deposit of unsurpassed richness, and is unequalled on this continent for wheat production. This is the locality of the great wheat farms, where thousands of acres are included in single fields, and cultivated with a minimum of human labor, agricultural machinery being employed to an unprecedented extent.

Red Root (*Ceanothus*), a genus of deciduous shrubs of the natural order *Rhamnaceæ*. The common red root of North America (*C. americanus*), which abounds from Canada to Florida, is a shrub of two to four feet high, with beautiful thyrsi of numerous small white flowers. It is sometimes called New Jersey tea, an infusion of its leaves being sometimes used as tea. It serves also as an astringent, and for dyeing wool of a cinnamon color. A Mexican species has blue flowers, and a California kind is used for evergreen hedges.

Redruth

Redruth, a town of Cornwall, England, in the center of a great mining district, 9 miles W. by S. of Truro. It has a town hall (1850), public rooms (1861), a miners' hospital (1863). William Murdock here in 1792 first used gas for lighting purposes.

Red Sea, an arm of the Indian Ocean, running N. N. W. from the Gulf of Aden, with which it communicates by the Strait of Bab-el-Mandeb, $13\frac{1}{2}$ miles across. Its length is about 1,200 miles, and its width in the central portion is between 100 and 200 miles, the greatest breadth being about 205 miles; it narrows toward the S. entrance, while in the N. it is divided by the peninsula of Sinai into two gulfs, the Gulf of Suez, 170 miles long by 30 miles wide, and the Gulf of Akaba, 100 miles in length.

The Arabian coasts of the Red Sea are usually narrow sandy plains backed by ranges of barren mountains; the African coasts toward the N. are flat and sandy, but farther S. high table-lands rise some distance inland, culminating still farther S. in the lofty mountains of Abyssinia. A marked feature in the configuration of the Red Sea is found in the large existing and upraised coral reefs running parallel to both the E. and W. shores, those to the E. being more extensive and farther from the coast than those to the W.; the most important are the Farisan Archipelago in the E. reef, and the large island of Dahlak, lying off Annesley Bay, in the W. reef. In addition to the islands of organic formation mention may be made of the volcanic group lying in lat. 14° N., the largest of which, Jebel Zugur, is 10 miles long, 7 miles wide, and 2,074 feet in height; farther N., on the islet of Jebel Teir, is a volcano which was active till quite recently. A dangerous reef, the Dædalus, lies directly in the path of steamers in lat. $24\frac{1}{2}^{\circ}$ N., and a lighthouse has been placed on it. The principal harbors on the Red Sea are Mocha, Hodeida, Lokeyyah, Jiddah, and Yenbo, on the Arabian coast, and Massowah, Khor Nowarat, and Suakim on the African coast.

In ancient times the Red Sea was used as a means of communication by the Phœnicians and other maritime peoples, till the discovery of the route round the Cape of Good Hope diverted the traffic into another channel, only to be revived, however, on a much more extensive scale with the construction of the Suez Canal.

The tides are very variable, depending largely on the direction and force of the winds, which also to a great extent determine the direction and velocity of the surface currents. The hot climate is due to the almost cloudless sky, and consequent want of rain, the altitude of the sun, and the absence of rivers. The mean temperature of the air generally ranges between 70° and

Red Sea

94° F. during the day, though readings of over 100° are often registered in the shade; but during the night the temperature may fall to the freezing point, owing to radiation in the clear atmosphere. The prevailing wind on shore is N. N. W. almost universally, but from October to May S. S. E. winds prevail over the S. portions of the sea, a belt of calms and variable winds occurring in the central regions, while in the N. portions the usual N. N. W. winds are met with. Evaporation is very great, and the air over the water is always very moist in the summer; hurricanes are unusual, but rain squalls frequently occur with the S. winds, and moderate gales and sandstorms, called "dragons" in the popular language of the Arabs, are not uncommon.

The temperature of the water below the surface decreases down to a depth of about 200 fathoms, from whence down to the bottom a mean temperature of about 71° is found all the year round; this agrees with the temperature conditions prevailing in the inclosed seas of the East Indies, for instance, according to the observations made on board the "Challenger," the depth at which the minimum temperature occurs (*i. e.* 200 fathoms in the Red Sea) indicating the depth of water over the barrier separating the sea from the open ocean. In winter, in the N. part, the whole body of water from surface to bottom usually has a mean temperature of 71° .

The salinity of the water is almost constant at about 1.030 (ordinary ocean water is about 1.026), and this is due to the fact that no rivers flow into it, little rain falls, and the evaporation is excessive. It has been estimated that, were the Red Sea entirely inclosed, it would become a solid mass of salt in less than 2,000 years, but this is prevented by an inflow of water through the Strait of Bab-el-Mandeb, and it is also known that a current of very salt water flows out underneath the incoming surface current.

The greatest depth in the Red Sea is about 1,200 fathoms, and the mean depth of the whole area about 375 fathoms. From the point of greatest depth, which is near the center, the bottom rises toward each end. Owing to the absence of rivers the deposits approach in character those formed in the open ocean, being largely composed of Foraminifera, Pteropods, and other pelagic shells. The marine fauna and flora are extensive, and have been described by Haeckel and other naturalists; it has been shown that a migration of the Red Sea and Mediterranean faunæ is taking place along the Suez Canal. The path by which the Israelites went out of Egypt was along the course of the valley called Wâdy Tumeilât, apparently an old arm of the Nile now silted up. The Lake of Ismailieh (Timsah) was then most probably the head of the Gulf of Suez,

Redshank

but the exact point of passage of this arm of the sea still remains obscure.

Redshank, a term applied to a Scotch Highlander having buskins of red deer skin, with the hair outward; used also in derision of his bare legs. In ornithology, the *Totanus calidris*, tolerably common over the greater part of Europe and Asia, from Iceland to China, retiring to the S. in winter. It derives its popular name from the color of the bare parts of its legs. The body is about the size of a snipe's, but the redshank, having longer wings, legs, and neck, appears the larger bird. General color above, grayish drab, speckled with black, lower part of the back and a band on each wing white. The nest is usually in tufts of rushes or grass, with four warm brown eggs, with blackish spots or blotches.

Red Shirts, the name of an organization formed in North Carolina for the purpose of preventing negroes from obtaining control of the State and municipal governments. The principal feature of the regalia of its members was a red shirt, and their rallying cry was "White Supremacy."



REDSTART.

Red Snow, snow colored red. Aristotle hinted at its existence; Saussure in 1760 discovered it on the St. Bernard, and Captain Ross in 1819 brought specimens from the Arctic regions. He had found eight miles of cliffs, 600 feet high, colored by it, in many places to the depth of 12 feet, where the rock was reached. Captain Parry and other Arctic explorers have since met with it abundantly. Mr. Shuttleworth, in 1839, and Professor Agassiz, in 1840, examined it in position in the Alps, and in 1823 Captain Carmichael sent it to Dr. Greville from the Lakes of Lismore, in Scotland. All authorities agree that it arises from minute organisms, vegetable or animal. Much of it is colored by the red snow plant.

Redstart, the *Ruticilla phoenicea*; common in Europe and Western Asia, migrating

Reduction

S. in the winter. Forehead pure white, throat black, upper surface dark gray; breast, sides, and tail bright rust-red. It nests usually in a hollow tree or in a hole in a wall or rock, and lays five to seven delicate greenish-blue eggs, sprinkled with faint spots of red. The black, or black-capped redstart, *R. titys* (or *titis*) is common on the Continent, but has not the extended N. range of the common redstart. In the United States the name is given to *Setophaga ruticilla*, a fly-catching warbler. Male, black with patches of orange-red. Female, olive with yellow patches.

Red Sunsets. The autumn of 1883 and the succeeding few months were noteworthy for the occurrence of brilliant phenomena in the W. sky in every part of the globe, but especially in the Indian Ocean and the South Pacific. Shortly after sunset a vivid red glow suffused the entire W. sky, remaining for upward of an hour, when it would slowly fade away. This strange sight was first noticed in India, where, it is said, the sun assumed a distinct greenish tinge on nearing the horizon. In the latitudes of North America these red sunsets were of almost nightly occurrence for several months. In striving to account for these strange manifestations a number of solutions were offered, but the theory that met with greatest acceptance was that they emanated from volcanic dust and gaseous matter vomited by Krakatoa, in Sunda Straits. Calculations demonstrated the fact that the manifestations of the red glow coincided with the course which such vapors would take on being wafted away by the prevailing winds. But this theory found many opponents.

Red Top, a well-known species of bentgrass, the *Agrostis vulgaris*, highly valued in the United States for pasturage and hay for cattle. Called also English grass and herd's grass.

Reducing Furnace, a furnace in which ores are deprived of their oxygen and reduced to the metallic state by the action of intensely heated vapors containing carbon, sometimes assisted by other reagents. It is used in the reduction of litharge, the treatment of copper ore in several stages and for obtaining the precious metals.

Reductio ad absurdum, a species of argument much used in geometry, which proves not the thing asserted, but the absurdity of everything which contradicts it. In this way the proposition is not proved in a direct manner by principles before laid down, but it shows that the contrary is absurd or impossible.

Reduction, a word with several applications, as: (1) the act or process of reducing to any state or condition; the state of being reduced; as, the reduction of a substance to powder. (2) the act of reducing or bringing into subjection; conquest, subjugation;

as, the reduction of a kingdom or fortress. (3) the act of reducing or diminishing in size, dimensions, value, quantity, force, etc., diminution, abatement; as, the reduction of expenses, the reduction of forces. (4) the amount, value, quantity, etc., by which anything is reduced or lessened; as, he made a reduction of 5 per cent. (5) the act or process of making a copy of a figure, map, plan, design, etc., on a smaller scale than the original, but preserving the form and proportion.

Red Water, the hæmaturia in cattle, occurring occasionally in sheep. It is of two kinds: (1) Acute, ushered in by a discharge of bloody urine, generally preceded by dysentery, suddenly changing to obstinate costiveness immediately before the red water appears. There is laborious breathing, with every indication of fever. The disease rapidly runs its course, and the beast soon succumbs. (2) Chronic, the more prevalent form. The urine is brown or yellowish-brown, the beast feeds fairly, but ruminates slowly, and after a few days a natural diarrhoea carries off the evil symptoms. Youatt considers these two forms essentially different maladies; the first, inflammation of the kidney; the second, inflammation of, or altered secretion from the liver.

Redway, Jaques Wardlaw, an American geographer; born in Nashville, Tenn., in May, 1849; studied at the University of California and at Munich, in Bavaria; became instructor of chemistry at the former institution and Professor of Physical Geography and Chemistry at the State Normal School of California. He engaged in mining in California and Arizona; traveled in South America, Europe, and Asia for the purpose of pursuing geographical investigations, and was author of several treatises on physical geography, etc., among them "Modern Facts and Ancient Fancies in Geography"; "Climate and the Gulf Stream"; "A Treatise on the Projection of Maps" etc.

Redwing, the *Turdus iliacus*, a European thrush, closely allied to the common thrush, but with red instead of gold color on the wings. It feeds on worms, slugs, and berries injurious to man. Called also red-sided thrush, wind thrush, and swine-pipe. The redwing is rather smaller than the song thrush, and its song decidedly inferior, though the bird has sometimes been termed the nightingale of Norway, and Linnæus spoke highly in praise of its song. The name is also given to a North American passerine bird, *Agelaius phœniceus*, of the family *Icteridæ*. Male, black with red spots, bordered with orange, on the wings.

Redwing, a city and county-seat of Goodhue co., Minn.; on the Mississippi river, and on the Duluth, Redwing, and Southern, the Minneapolis and St. Louis, and the

Chicago, Milwaukee, and St. Paul railroads; 41 miles S. E. of St. Paul. Here are electric lights, public library, city hospital, Hage Seminary, State Training School, and Redwing Seminary (Luth.). The city is a great market for wheat, its chief article of export. It has manufactures of flour, steam engines, agricultural machinery, lumber, doors, sash, and blinds, and an assessed property valuation of over \$2,000,000. Pop. (1900) 7,525; (1910) 9,048.

Redwood, the name of various sorts of wood of a red color, as an Indian dyewood, the produce of *Pterocarpus santalinus*; the wood of *Gordonia Hæmatoxylon*, the redwood of Jamaica; that of *Pterocarpus dalbergioides*, or Andaman wood; that of *Ceanothus columbrinus*, the redwood of the Bahamas; that of *Sequoia sempervirens*, a coniferous tree of California, the redwood of the timber trade; that of *Soyimida febrifuga*, of which the bark is used in India for fevers, and has been employed successfully in Europe for typhus.

Redwood of California.—This tree is found only in California and in but a comparatively contracted area even there. From Santa Cruz county on the S. to the Oregon line on the N. it attains full development, but lower than Mendocino county, owing to vicinity of the great markets, the forests have been about exhausted and these localities are no longer considered producers. A considerable acreage in Santa Cruz county has been recently appropriated as public domain. The available redwood, therefore, is now confined to about 318 miles of coast. The annual product in this region is about 320,000,000 feet, and it is estimated, at the present rate of consumption, that enough standing timber exists to last for 150 years. The redwood is rarely found beyond the reach of the ocean fogs; its extreme limit being 35 miles inshore, and then only when some valley-like depression permits the entrance of fog to that distance. The tree seems to have an affinity for the salt sea fog and attracts it about its lofty branches. There it condenses and falls to the ground in a gentle rain. The ground under the redwood tree is always moist.

The redwood is the *Sequoia sempervirens* of botanists and is distinct from the *Sequoia gigantea* of the Sierras. The first is never found far from the sea, the latter always on the declivities of the Sierra Nevadas and seldom at an altitude lower than 4,000 feet, and in regions where the rainfall is never excessive. In size they are much alike. The few remaining groves of the *Sequoia gigantea* are in Mariposa and Calaveras counties, California, and some of them are 400 feet in height and of tremendous girth. The timber is inferior to that of the redwood, which is noted for endurance and strength. Its resistance to fire is no fable, but a sober fact. The lumber

Redwood

is becoming more in demand for decorative purposes. Its color, a light salmon when first cut, afterward turns to a deep red. When thoroughly dried there is no shrinkage and it readily yields to the chisel of the carver. Piano cases made from the wood are said to give increased resonance to the instrument. Large quantities are consumed for interior finishing with gratifying effects. In addition to other fine qualities the wood takes on a beautiful polish and even the stumpage, till recently considered worthless, is found to possess valuable qualities. The roots and woody excrescences at the base of the tree give fine effects in wavy outlines, and when polished the material is much valued for decorative purposes.

In the Eel river redwood district, Humboldt county, there are 80,000 acres of timber lands, which will produce at a low estimate 75,000 feet to the acre. In size the trees range from four to six feet in diameter; if below 18 inches they are left standing. Of the larger sizes from 8,000 to 12,000 feet are produced from each tree. A single tree grown in this valley has produced 80,000 feet of merchantable lumber.

Felling one of these enormous trees is an operation requiring great experience on the part of the woodsman. In the first place, a tract is selected containing a goodly number of the proper sizes, as well as being advantageously located for getting the logs to the railroad for conveyance to the mill. The experience of the cutter will indicate the first and next in order to be felled. Each tree must lie in its own bed. A platform is then erected surrounding the trunk from 6 to 8 feet above the ground. With a saw an undercut is made through the trunk, not quite to the center, and from the opposite side a crosscut is sawed, ending a foot or two above the undercut and leaving a section of solid lumber between. The "gunsight," or the place where the tree is to fall, is then calculated to a certainty and the ground cleared of all projections that would prevent the great trunk from falling flat on the earth. The woodsman who cannot calculate within a few feet the exact spot where the extreme top of a tree, no matter the height, will lie when down does not know his business. The rule is that when 10 per cent. of a tree is "split" when felled the chopper is incompetent and is discharged. When the exact place where the tree is to fall is selected, the choppers ascend the platform and with axes hew out an angular-shaped piece having the undercut as a base. When this cut is made the second or crosscut is wedged till the tree topples over and falls to the ground, the solid section of the trunk, not pierced by the cuts, supporting the tree till the center of gravity is passed, and then the mighty frame falls on its prepared bed almost intact.

Reebok

The next operation is performed by the "ringers" and "peelers." Every 12 or 14 feet, as required, a ring is cut around the circumference of the bark, and afterward the peelers with crowbars and wedges "peel" the bark from the prostrate trunk. Finally all of the trees are stripped but surrounded with an immense accumulation of debris of bark and branches, which must be removed before the trunks can be sawed into suitable lengths for conveyance to the mill. The ground is cleared by fire, precaution being first taken to plug up the "splits" in the trunk with clay so that the fire may not reach the interior of the tree. A foggy day is chosen and a still one. Fire is started and in a short time the tract is burning with a fierce heat that quickly reduces the piles of bark and brush to ashes, and leaves an unobstructed field for the removal of the timber which has been scarcely charred by the intense heat to which it has been subjected.

The trunks as they lie are then cut into stated lengths with crosscut saws, and then follows the arduous task of conveying these enormously heavy sections to the railroad. This operation is one of extreme difficulty, involving the transportation of the logs from the precipitous hillsides and conveying them uninjured over long distances.

Temporary skidways are laid down and roads constructed. Chutes down which the logs pass have to be planned, and on these, guided by the skillful woodsmen, the unwieldy logs at last reach their destination. The work is laborious in the extreme and is assisted by donkey engines on sleds, which are hauled to the top of the steep banks and into seemingly impossible situations. With the aid of these engines loading on cars is accomplished without special difficulty. Twenty-five miles of broad gauge track penetrate into all parts of this district and 180 flat cars are employed in transporting the timber and finished products.

Scotia, the town where the immense manufacturing plant of the Pacific Lumber Company is located, is situated 25 miles from the mouth of Eel river. Schools, churches, and dwellings are owned by the company, as well as the land on which they are built. The pond at the millside has room for 4,000,000 feet of logs, which are drawn on when the rains of the winter season render logging impracticable. The capacity of the mill is 175,000 feet per day, exclusive of 500,000 shingles and a large number of railroad ties.

Ree, Lough, a lake of Ireland, formed by the Shannon, between the counties of Longford, Westmeath, and Roscommon, 17 miles long and from 1 mile to 6 miles broad, studded with islands.

Reebok, or **Rheebok**, the *Antelope capreolus* (*Pelea capreola*), from South Af-

rica. Length about 5 feet, height at shoulder 30 inches; uniform ash color on neck, shoulders, sides, croup, and thighs, white or light gray on under surface and inside of limbs. They live in small groups of five or six individuals.

Reed, in music, the sounding part of several instruments, such as the clarinet, bassoon, oboe, and bagpipe, so called from its being made from the outer layer of a reed (*Arundo sativa* or *donax*) found in the S. of Europe. The name is also applied to the speaking part of the organ, though made of metal. Reeds are generally divided into two kinds—the beating reed, used in the

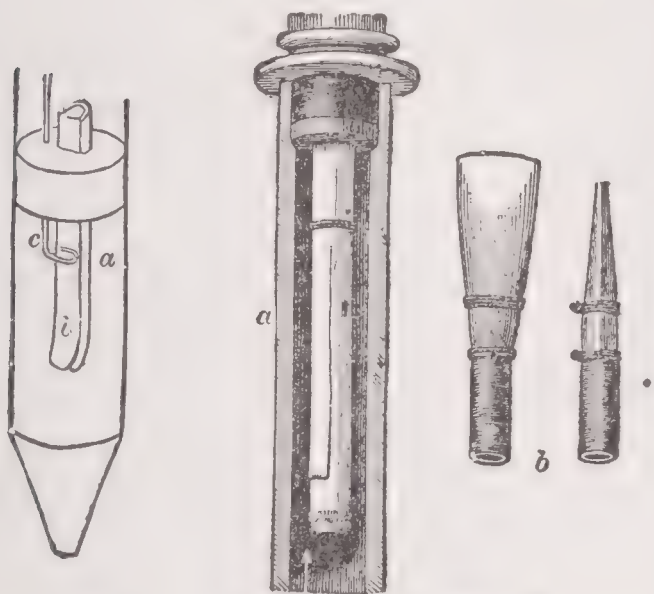


FIG 1.

FIG. 2.

organ, clarinet, etc., requiring to be placed within a tube to produce a musical sound, and the free reed, used in instruments of the harmonium and concertina kind. The organ reed (fig. 1) consists of a metal tube, *a*, with the front part cut away and having a metal (brass, German-silver, or steel) tongue, *b*, covering the orifice, attached at the upper end, and bent forward at the lower end to permit of vibration. The admission of a current of air to the outer tube causes the tongue to vibrate against the edge of the opening in the tube *a*, producing

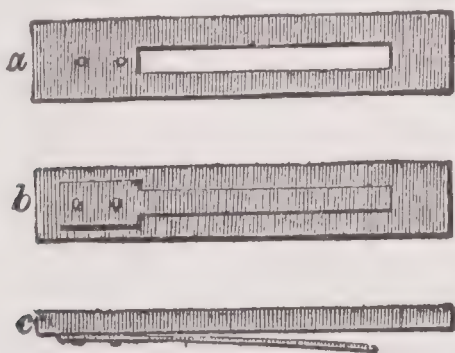


FIG. 3.

a musical note, the pitch of which is determined by the length of the free end of the reed; this is regulated by a strong movable spring, *c*, pressing against it, the quality

of the sound depending on the length and form of the outer tube. The reed in the drone of the bagpipe is on the same principle as the organ reed, and is made of a piece of reed tube a few inches long, cut across a knot at one end so as to make a stop. A slit is cut in it with a knife to make the tongue. It is shown in fig. 2, *a*, in situ, the outer tube being shown in section; the air enters from the bag in the direction of the arrow, the free end is the stopped one. The double beating reed (fig. 2, *b*) is that used in the bassoon, oboe, and the chanter of the bagpipe, and consists of two reeds, shaped so as to be tied together in the form of a tube at one end, either with or without the aid of a metal pipe, to fit the end of the instrument, and thinned away at the other end, where the two meet with a little space between them in the center. The air being blown into the thin end causes the two reeds to vibrate against one another. The free reed, shown in fig. 3, consists of a metal tongue, *b* and *c*, fixed at one end to a metal plate, *a*, having an elongated slot large enough to allow the free end of the tongue to vibrate through it on the admission of a current of air; and this vibration forms the note, the pitch of which is regulated by the length of the reed.

Reed, in weaving, an appurtenance of the loom, consisting of two parallel bars set a few inches apart, and furnished with a number of parallel slips or reeds, called dents, between which the warp threads are passed. The reed is set in a swinging frame, called a lathe, lay, or batten. In the hand lathe, the bottom of the batten is furnished with a shelf, called the shuttle race, along which the shuttle is driven. The office of the reed is to beat the weft up to the web, and the force of the blow determines the compactness of the fabric. Two threads of yarn pass between each of the reed splits or dents. The number of dents in a reed of a given length determines the fineness of the cloth.

Reed, Andrew, an English philanthropist; born in London, England, Nov. 27, 1788; was educated in his native city and in 1811 was there ordained pastor of an independent congregation. He visited the United States in 1834, where he studied educational and religious conditions. In 1813 he established the London Orphan Asylum; in 1827 the Infant Orphan Asylum; in 1847 the Asylum for Fatherless Children in Croydon; and later the Royal Hospital for Incurables and the Royal Asylum for Idiots. He was the author of "Visits to the American Churches" (with the Rev. James Matheson, 2 vols. 1836); "Martha" (1836); "The Day of Pentecost"; "The Revival of Religion" and "Earnest Piety Essential to Eminent Use

Reed

fulness" (1839); and "Advancement of Religion the Claim of the Times" (1847); etc. He died in London, England, Feb. 25, 1862.

Reed, Charles Alfred Lee, an American surgeon; born in Wolf Lake, Ind., July 9, 1856; was educated at Miami University; Oxford, O., and received his medical training at the Cincinnati College of Medicine and Surgery. He was Professor of Gynecology and Abdominal Surgery at the Cincinnati College of Medicine and Surgery in 1882-1895; became gynecologist at the Cincinnati Hospital in 1896; and was president of the American Medical Association in 1900-1901. His publications include many monographs in 1880-1900, and a "Text Book of Gynecology" (1900).

Reed, Elizabeth Armstrong, an American author; born in Winthrop, Me., May 16, 1842; was chiefly educated by private tutors. She was the only woman whose work was ever accepted by the Philosophical Society of Great Britain. She was chairman of the Woman's Congress of Philology in Chicago in 1893, and was a member of several learned societies. Her works include "The Bible Triumphant" (1866); "Hindu Literature: or the Ancient Books of India" (1891); "Persian Literature, Ancient and Modern" (1893); and "Primitive Buddhism, its Origin and Teachings" (1896).

Reed, George Edward, an American educator; born in Brownville, Me., March 28, 1846; was graduated at Wesleyan University in 1869; studied theology in Boston University; entered the New England Southern Conference 1870; from 1870 to 1889 he filled some of the most important appointments in the Methodist Episcopal denomination; in 1889 was elected president of Dickinson College, Carlisle, Pa.; and in 1899 became State Librarian of Pennsylvania.

Reed, Hugh, an American military officer; born in Richmond, Ind., Aug. 17, 1850; was graduated at the United States Military Academy in 1873; was principally on frontier duty till 1881, when he was made inspector-general on the staff of Gov. Albert G. Porter of Indiana. In 1884 he was granted leave of absence owing to ill health brought on by exposure on the Western plains, and was retired April 23, 1889. His publications include "A Calendar of the Dakota Nation" (1877); "Signal Tactics" (1880); "Cadet Regulations" (1881); "Artillery Tactics" (1882); "Military Science and Tactics" (1883); "Standard Infantry Tactics" (1883); and "Broom Tactics, or Calisthenics in a New Form" (1883); etc.

Reed, James, an American clergyman; born in Boston, Mass., Dec. 8, 1834; was

Reed Mace

graduated at Harvard College in 1855; was ordained a Swedenborgian minister and in 1868 became pastor of the Boston Society of the Church of the New Jerusalem. Later he was elected president of the New Church Theological School (Swedenborgian), Cambridge, Mass. He was also for several years president of the Massachusetts Home for Intemperate Women, and editor of the "New Church Review." His publications include "Swedenborg and the New Church"; "Religion and Life"; and "Man and Woman, Equal but Unlike."

Reed, John Joseph, an American naval officer; born in New Jersey; was graduated at the United States Naval Academy in 1861; served through the Civil War, being with the Atlantic Squadron in 1861, the West Gulf Blockading Squadron in 1862, and in all the battles with Admiral Farragut from the Southwest Pass of the Mississippi to Vicksburg in 1862-1863; was promoted lieutenant in February, 1864; lieutenant-commander in July, 1866; commander in December, 1877; captain in April, 1893, and rear-admiral in November, 1900; and was appointed commandant of the Portsmouth navy yard in April, 1901.

Reed, Thomas Brackett, an American statesman; born in Portland, Me., Oct. 18, 1839; was graduated at Bowdoin College in 1860; studied law; appointed assistant paymaster United States navy in 1864; admitted to the Portland bar; member of the Maine Legislature 1868-1869, and of the Senate 1870; State attorney-general, 1870-1872; member of Congress 1877-1899; and speaker of 51st, 54th, and 55th Congresses. In 1896 Mr. Reed was a prominent candidate for the Republican presidential nomination. He resigned from Congress in 1899, and resumed the practice of law in New York city. He died Dec. 7, 1902.

Reed Bunting, the *Emberiza schæniclus*, common in swampy places, all over Europe, length of male, six inches; head, chin and throat black; belly and nuchal collar white; upper surface brownish black, each feather bordered with bright bay. In autumn and winter the bordering in the adult male becomes so broad that the darker tints are to some extent lost sight of. Called also reed sparrow.

Reed Mace, a plant of the genus *Typha*, natural order *Typhaceæ*. Two species are common, *T. latifolia*, or greater reed mace, and *T. angustifolia*, the lesser. These plants are also known by the name of cattail, and grow in ditches and marshy places, and in the borders of ponds, lakes, and rivers. They are tall, stout, erect plants, sometimes six or eight feet high, with creeping root stocks, long flag-like leaves, and long dense cylindrical brown spikes of minute flowers. They are sometimes erroneously called bulrush.

Reed Warbler, the *Acrocephalus streperus*, a summer migrant to temperate Europe late in April, and leaving late in September. It is an incessant songster, and its notes are varied and pleasing. The male is about 5½ inches long, upper surface uniform pale brown, with a tinge of chestnut; chin, throat, and belly white.

Reef, the portion of a square sail between the head and any of the reef bands. The first reef in a square sail is included between the head and the upper reef band; the second reef between this and the next lower reef band, and so on. The object of the reef is to diminish the surface of the sail when the wind is blowing hard. A balance reef is the uppermost or closest reef extending diagonally upward from the outer leech when close-reefed.

Reef, a chain, mass, or range of rocks in various parts of the ocean, lying at or near the surface of the water.

Reef Knot, in nautical language, a knot formed by passing the ends of the two parts of one rope through the loop formed by another whose two ends are similarly passed through a loop on the first; the two parts of one rope are passed above, and of the other below the loop through which they are inserted. A longitudinal pull tightens the knot, which can only be untied by pushing the loops in opposite directions.

Reel, a revolving contrivance on which fiber, thread, cord, rope, fabric, etc., are wound, to form them into hanks or skeins, and for various other purposes; applied to:

Agriculture, a device having radial arms carrying horizontal slats, and rotated by gear or pulley connected with the axle of a harvester, for pressing backward and holding the stalks of grain in position for being severed by the knives. Angling, a skeleton barrel attached to the butt of a fishing rod, around which the inner end of the line is wound, and from which it is payed out as the fish runs off with the bait, and is gradually wound in again as his struggles become less violent, bringing him to land or to the landing net. Baking, a cylinder with radial arms rotating in a heated chamber, carrying pans in which loaves of bread are placed for baking in the reel-oven. Cotton machinery, a machine on which cotton is wound, making hanks of thread, each 840 yards in length. Domestic, a spool or bobbin of wood on which cotton, thread, silk, etc., is wound for use in sewing. Milling, the barrel or drum on which the bolting cloth is fastened. Nautically, a revolving frame to hold a line or cord, as: (a) the log-reel; (b) the deep sea-reel; and (c) the spun-yarn-reel, etc. Rope-making, spun-yarns are wound on a reel preparatory to tarring or laying up into strands as the twisting of each length is completed. Silk-

making, the revolving frame on which silk is wound from the cocoons, or yarn is wound off from the spindle of a hand-spinning machine, and reeled into cuts or hanks. Telegraphy, a barrel on which the strip of paper for receiving the message is wound in a recording telegraph.

Reel, a lively rustic dance, peculiar to Scotland, in which the couples sometimes swing or whirl round, and sometimes pass, forming the figure 8. In the United States, the Virginia reel is widely popular. Also the music for such a dance, generally written in common time, but sometimes in jig time of six quavers to a bar.

Reel and Bead, in architecture, a kind of enriched molding much used by the Greeks and Romans, and, with various modifications, in other styles. It consists of a series of bodies resembling reels, or spindles, and beads, or pearls, following each other alternately, and may be arranged in straight or curved lines.

Reem, in Scriptural zoölogy, *Bos primigenius*. In the Authorized Version the influence of the Septuagint has prevailed, and the word is translated unicorn, but erroneously, as the mention of two horns on one reem (Deut. xxxiii: 17) proves. The word unicorn has disappeared from the Revised Version, wild ox being substituted for it; but in Numb. xxiii: 22, the alternative rendering ox-antelope (*Oryx leucoryx*) is given in the margin. Young transliterates the Hebrew word.

Reentry, in law, the resuming or retaking the possession of lands lately lost. A proviso for reentry is a clause usually inserted in leases, that upon non-payment of rent, etc., the term shall cease.

Rees, Abraham, an English cyclopædist; born in Slanbrynmair, Wales, in 1743. He was educated at Hoxton Academy, where he remained as tutor for over 20 years; became pastor of a Presbyterian Church in Southwark, and afterward in the Old Jewry; edited "Chambers's Cyclopædia" (1776-1786); and subsequently a larger work called "Rees' Cyclopædia" (1802-1819, 45 vols.). He died June 9, 1825.

Rees, John Krom, an American educator; born in New York city, Oct. 27, 1851; was graduated at Columbia University in 1872, and at the Columbia School of Mines in 1875. In 1873 he was made assistant Professor of Mathematics in the Columbia School of Mines, and in 1876 Professor of Astronomy in Washington University, St. Louis. Subsequently he was director of the observatory and instructor in geodesy and practical astronomy in Columbia University, and in 1892 became Professor of Astronomy there. He was president of the New York Academy of Sciences in 1894-1896; secretary of the American Met-

ropolitan Society in 1882-1896; was elected Fellow of the Royal Astronomical Society of London; and in 1901 received the decoration of Chevalier of the Legion of Honor. He died March 9, 1907.

Reese, David Meredith, an American physician; born in Philadelphia, Pa., in 1800; was graduated at the Medical Department of the University of Maryland in 1820; removed to New York city, where he became eminent in his profession; was physician-in-chief at Bellevue Hospital for several years, and afterward was county and city superintendent of public schools. He was the author of "Observations on the Epidemic of Yellow Fever" (1819); "Review of the First Annual Report of the Anti-Slavery Society" (1834); "Quakerism vs. Calvinism" (1834); "Medical Lexicon of Modern Terminology" (1855); etc. He died in New York city, Aug. 12, 1861.

Reeve, the name given to the female of the bird called the ruff. See RUFF.

Reeve, the title of the official existing in early times in England, who was appointed by the king to carry into execution the judgments of the courts presided over by the ealdorman (earl) and other high dignitaries, to levy distresses, exact the imposts, contributions, tithes, and take charge of prisoners.

Reeve, Clara, an English novelist; born in Ipswich, England, in 1729. Her most famous work is "The Champion of Virtue: A Gothic Story" (1777), afterward published under the title of "The Old English Baron." She had previously written "The Phoenix" (1772), a translation from the Latin of Barclay's romance "Argenis." Among her other and less important works are: "The Two Mentors" (1783); "The Progress of Romance" (1785); and "The Exiles; or, Memoirs of Count de Cronstadt" (1788). She died Dec. 3, 1807.

Reeves, Helen Buckingham (née **Mathers**), an English novelist; born in Crewkerne, Somersetshire, Aug. 26, 1853. Her novels treat of domestic English life, and are exceedingly popular. They include: "Comin' through the Rye" (1875); "The Token of the Silver Lily," a poem (1876); "Cherry Ripe" (1877); "As He Comes up the Stair" (1878); "The Land of the Leal" (1878); "My Lady Green Sleeves" (1879); "The Story of a Sin" (1881); "Sam's Sweetheart" (1883); "Eyre's Acquittal" (1884); "Jock o' Hazeldean" (1884); "Found Out" (1885); "Murder or Manslaughter?" (1885); "The Fashion of this World" (1886); "A Study of a Woman" (1893); and "A Man of the Time" (1894); "The Sin of Hagar"; "Venus Victor"; "The Juggler and the Soul" etc.

Reeves, John Sims, an English singer; born in Shooter's Hill, Kent, Oct. 21, 1822.

At 14 he was a clever performer on various instruments, and was appointed organist and director of the choir in the church of North Cray in Kent. He first appeared in public as a baritone at Newcastle in 1839. This début was a complete success; and he acquired fresh fame, but as a tenor, in London. In order to perfect his voice and style he studied at Paris (1843) for some time, and then appeared at Milan in the tenor part of Edgardo in "Lucia di Lammermoor." He returned to England in 1847, and, coming out at Drury Lane as Edgardo, was immediately recognized as the first English tenor, a position he maintained for many years. He was engaged in 1848 at Her Majesty's Theater, and in 1851 sang as first tenor at the Italian Opera in Paris. After ceasing to sing on the stage (after 1860) he became popular all over the country as a ballad singer at concerts. He especially excelled in singing oratorio parts, his first oratorio rôle having been in "Judas Maccabæus" in 1848; from that year onward he sang almost regularly at the great annual musical festivals. His voice was of wide range and of great purity. He died Oct. 25, 1900.

Reeves, Marian Calhoun Legaré, an American novelist; born in Charleston, S. C., about 1854. She began to write in 1866 under the pseudonym of "Fadette." Her publications include: "Ingemisco" (1867); "Randolph Honor" (1868); "Sea-Drift" (1869); "Wearithorne" (1872); "A Little Maid of Arcadie" (1888); and in conjunction with Emily Read, "Old Martin Boscawen's Jest" (1878), and "Pilot Fortune" (1883).

Reeves, Walter, an American lawyer; born near Brownville, Pa., Sept. 25, 1848; removed to Illinois in 1856; taught school; and later became a lawyer. He was a Republican representative in Congress from the 11th Illinois district in 1895-1903; chairman of the Committee on Patents, and a member of the Committee on Rivers and Harbors. He died April 9, 1909.

Reference, the act or process of assigning a cause depending in court, or some particular point in a cause for hearing and decision, to a person or persons appointed by the court.

Referendum, a system of legislation which consults all the electors of a State as to whether new laws shall be confirmed. In some cantons of Switzerland a method resembling the referendum has been practised since the 16th century. The present form was adopted in the canton of St. Gallen in 1830. In 1848, in spite of Conservative opposition, the referendum was, by the action of the Radicals, incorporated in the Swiss federal constitution, and in 1874 its application was extended. In all the

Swiss cantons, except Freiburg, the referendum is now established. According to the Swiss federal constitution, all constitutional amendments must be ratified by the Swiss electorate before they become law. Other measures must be submitted to the popular vote, if demanded within 90 days after their publication by 30,000 voters, or by the governments of eight cantons. During the 17 years, 1874 to 1891, out of 149 laws, 27 were referred to the people; of these 15 were rejected. The referendum has worked so well that it has conquered all opposition to it, and it is now generally regarded as a check on hasty and class legislation. It will be observed that the essence of it is that it submits to the people a single and clear issue upon which they may give their decision. There exists also an obligatory referendum in eight cantons, where every law and every expenditure beyond a fixed maximum must be submitted to the mass of the electors, and it is not necessary that a demand for this submission to the electors should be made. In Great Britain what may be termed a kind of local referendum with regard to the "Adoptive Acts" was set up by the Parish Councils Act of 1894. There is a growing demand in the United States for the general introduction of direct legislation by means of the referendum, and in several places the system is practised.

Refining of Metals, the processes by which the various metals are extracted from their ores, and obtained in a state of purity. See the articles on the several metals.

Reflecting Circle, an instrument for measuring altitudes and angular distances, invented by Mayer about 1744, and afterward improved by Borda and Troughton. In principle and construction it is similar to the sextant, the graduations, however, being continued completely round the limb of the circle. Troughton's has three arms radiating from the center at angular distances of 120° apart, each provided with a vernier, so that each angle measured is derived from the mean of three readings at opposite points of the arc, which tends to correct errors of centering and graduation. Also called a repeating circle.

Reflecting Galvanometer, Sir William Thomson's instrument, consisting of a very small magnet, made of a piece of watch spring, suspended between two flat bobbins of fine insulated copper wire. The magnet carries a very small concave mirror, which is adjusted by means of a directing magnet to throw the rays of light, issuing from a lamp and reflected from the mirror, on the zero of a horizontal graduated scale when no current is passing, or when two equal and opposite currents neutralize each other. In any other case the vibrations of the mag-

net cause the image to be deflected to the right or left of zero by an amount proportional to the force and duration of the current.

Reflecting Microscope, a form of microscope first proposed by Newton, in which the image formed by a small concave speculum may be viewed either by the naked eye or through an eye piece. The object is placed outside of the tube of the microscope, and reflects its image to the speculum by means of a plane mirror, inclined at an angle of 45° to the axis of the former.

Reflecting Telescope, a telescope in which the rays are received on an object-mirror and conveyed to a focus, at which the image is viewed by an eye piece.

Reflection, that which is reflected, or produced by being reflected; an image given back from a reflecting surface. Also the act or habit of turning the mind to something which has already occupied it; thoughtful, attentive, or continued consideration or deliberation; meditation, thought.

A surface on which a beam of light falls may be either rough or smooth. If it be rough, the greater part of the incident light is irregularly scattered by the innumerable surface facets, so as to be reflected or dispersed in all directions; if it be smooth, a proportion (but never the whole) of the incident light is regularly reflected or turned back in definite paths. A smooth, dustless mirror is not visible to an eye outside the track of rays reflected from it. If the polished surface be that of a transparent substance (*e. g.*, glass) optically denser than the medium conveying the light to it, comparatively little light is reflected; but the more oblique the incidence, the smoother the polish, and the greater the difference between the optical density of the glass and that of the medium in which it is immersed, the greater the proportion reflected. Thus less light is reflected from glass under water than from glass in air; and conversely, if the light travel in the denser medium and strike the bounding surface between it and a rarer medium—as where light ascending through water strikes its upper free surface—it will, if its obliquity of incidence exceed a certain limit, be almost totally reflected; the small loss that ensues arising wholly from absorption, while no light is transmitted into the air above. This may be shown by holding a clear tumbler of water above the head: the image of objects beneath is seen reflected in a bright mirror surface; and a phenomenon of the same order is seen on thrusting a test tube containing air below the surface of water, when it will appear to have a luster like quicksilver. If the reflecting surface be that of an opaque body the bulk of the incident light is reflected, a percentage be-

ing lost by absorption. What has been said about light applies equally to ether undulations of all kinds, and therefore the theory of reflection has general reference to radiant heat, light, actinic radiation, and electro-magnetic undulations. Reflection arises in all cases from a difference in the transmissibility of ether disturbances on the two sides of the bounding surface.

On reflection from polished surfaces we have, so far as regards the directions of the reflected rays, the following laws observed: (1) The incident "ray," the normal (*i. e.*, a line drawn perpendicular) to the surface at the point of incidence, and the reflected "ray" all lie in one plane, the "plane of incidence"; and (2) the angle of incidence (the angle which the incident "ray" makes with the normal to the reflecting surface) is equal to the angle of reflection (the corresponding angle between the normal and the reflected "ray"). These laws apply equally to ether waves of all lengths, and therefore to light of all colors; and they also hold good whatever be the shape of the surface. If the surface be plane their application is simple; and if the surface be curved we have, in effect, to consider the curved surface as made up of indefinitely small facets, to each of which the above laws can be applied. The geometrical consequences of these laws make up what used to be called *Catoptrics*, that part of geometrical optics which deals with reflection; and this coincides in its propositions with that part of kinematics which gives an account of the reflection of waves. Here the other waves (using the term "waves" in its most general sense) are assumed to travel through optically homogeneous media, and can consequently be traced out by imaginary lines drawn at right angles to the wave fronts or along the directions pursued by the waves, these imaginary lines being called "rays."

Plane Reflecting Surfaces.—(1) Rays which are parallel to one another before striking a plane reflecting surface are parallel after reflection. (2) If light diverging from or converging toward a point be reflected from a plane mirror, it will appear after reflection to diverge from or converge toward another point situated on the opposite side of the mirror and at an equal distance from it. If, on the other hand, the course of the light is such that the rays appear before reflection to converge on the second point, they will after reflection actually pass through the first one. (3) A consequence of the preceding proposition is that when an object is placed before a plane mirror the virtual image is of the same form and magnitude as the object, and at an equal distance from the mirror on the other side of it. The right hand of the image taken as looking toward

the mirror, is necessarily opposite to the left hand of the object; so that no one ever sees himself in a single plane mirror as others see him or as a photograph shows him, but he sees all his features reversed. (4) When two mirrors are placed parallel to one another, light from an object between them is reflected back and fore, so as to appear on each occasion of reflection as if it came from images more and more remote from the mirrors. On each occasion the course of the rays of light is the same as if the virtual image behind the mirror had been a real object; and a new virtual image is produced, apparently as far behind the reflecting mirror as the virtual object had been in front of it. If the mirrors were perfectly plane and parallel, and if they reflected all the light which fell on them, an observer between the mirrors would see in this experiment (which is called the *endless gallery*) an indefinite number of images. A variation of this experiment, carried out with mirrors not parallel to one another, but inclined at an angle which is some aliquot part of 180° , gives the principle of the *kaleidoscope*. (5) When a beam of light is reflected from a mirror and the mirror is turned through a given angle, the reflected beam is swept through an angle twice as great. This principle is utilized in the construction of many scientific instruments, in which the reflected beam of light serves as a weightless pointer, and enables us to measure the deflection of the object which carries the mirror. (6) When a beam of light is reflected at each of two mirrors, inclined at a given angle, the ultimate deviation of the beam is (if the whole path of the light be within one plane) equal to twice the angle between the mirrors. This proposition is applied in the quadrant and sextant. (7) When a wave of any form is reflected at a plane surface it retains after reflection the form which it would have assumed but for the reflection, this form being, however, guided by reflection into a different direction.

Curved Reflecting Surfaces.—In these we have to trace out the mode of reflection of incident rays from each "element" or little bit of the reflecting surface; and this leads, through geometrical working, to such propositions as the following: (1) Parallel rays, traveling parallel to the axis of a concave paraboloid mirror are made to converge so as all actually to pass accurately through the geometrical focus of the paraboloid; and, conversely, if the source of light be at the geometrical focus, the rays reflected from the mirror emerge parallel to one another—a proposition of great utility in lighthouse work, search-lights, etc. (2) If the paraboloid mirror be convex, parallel incident rays have, after reflection, the

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same course as if they had come from the geometrical focus of the paraboloid. (3) In a concave ellipsoid mirror, light diverging from one "focus" of the ellipsoid is reflected so as to converge on the other "focus" of the curved surface; and by a convex ellipsoidal mirror light converging toward the one focus is made to diverge as if it had come directly from the other focus. (4) In a hyperboloid reflector the two geometrical foci have properties corresponding to those of the ellipsoid. (5) In spherical reflectors, which are those most easily made, there is no accurate focus except for rays proceeding from the center and returning to it. When parallel rays are incident on a concave spherical mirror we see that if they be parallel to the axis of the mirror each ray is made to pass after reflection through a point, which is nearer to a point midway between the mirror and its center, the narrower is the pencil of rays. If, therefore, the pencil of rays be very narrow in comparison with the radius, the rays will after reflection approximately converge on the midway point, which is called the principal focus of the mirror. The reflected rays from the various parts of the mirror form by their intersection a caustic, the apex or cusp of which is at the midway point.

As to the quality of the light reflected there are some peculiarities to be observed. From the surface of a transparent body, of greater optical density than the surrounding medium, light polarized in the plane of incidence and reflection is more largely reflected at oblique incidences than light polarized at right angles to that plane; when the angle of incidence is such that the reflected and refracted rays tend to be at right angles to one another, the whole of the light reflected is polarized in the plane of incidence and reflection; and if light polarized at right angles to that plane be made to fall on glass at the particular angle of incidence just referred to, it will not be reflected at all, but will wholly enter the glass. Plane-polarized light polarized in any other plane than that of incidence or one at right angles to it, is, after total reflection in glass, found to be elliptically polarized; and this phenomenon is always presented in reflection from metals. In the case of electro-magnetic radiation theory and practice concur in indicating that conductors are good while non-conductors are bad reflectors; and the same general proposition holds good with reference to those more frequent but otherwise similar ether oscillations to which the phenomena of radiant heat, light, and actinism are due.

Reflection Observations, in astronomy, those which measure the direction of a beam of light which has been reflected from

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the surface of some liquid, generally mercury. Sometimes it is a beam from a heavenly body, as in sextant observations with an artificial horizon, or in measuring the reflected zenith distance of a star with a meridian circle in an observatory, and sometimes it is a beam of light, or rather the want of light, which makes the shadow of the wires of a transit or meridian circle from a lamp used in the nadir observations of an observatory. In all cases it is better to amalgamate the mercury with nearly as much lead as it will dissolve, in order to increase its steadiness, for pure mercury seems almost "alive."

Reflector, that which reflects, or throws back rays of light, heat, etc.; a reflecting surface. In optics, a device by which the rays proceeding from a luminous or heated object are thrown back or diverted in a given direction. The reflecting surface may be either plane or curved. In practice it is often made spherical or parabolic. The former does not bring the rays to a true focus, but is easily formed, and is consequently generally employed where extreme accuracy is not sought for. A mirror is a familiar example of a plane reflector. The material should be as smooth and highly polished as possible. Sheet tin is frequently used for common purposes, as for door or hall lamps, or those carried by vehicles, while for other purposes a more perfectly reflecting surface is employed, such as speculum metal or silver protected by glass. Silver is the most perfectly reflecting substance known, absorbing but 9 per cent. of the incident rays, while speculum metal absorbs 37 per cent. Glass itself, owing to its property of totally reflecting incident rays at a low angle, is used in certain cases. Reflectors with parabolic surfaces are employed for throwing the light emanating from objects placed in their foci in parallel straight lines to a great distance, and for converging the heat rays from a distant object, as the sun, to a focus, and also, in connection with eye glasses, in the reflecting telescope, which is itself often simply designated a reflector.

The term mirror is less comprehensive than that of reflector, being usually only applied to such surfaces as afford definite images and colors, while a reflector may not merely be used for throwing back the rays of light and heat, or of heat only, but also the waves of sound.

Reflexive Verb, a verb which has for its direct object a pronoun which stands for the agent or subject of the verb; as, He forswore himself. Pronouns of this class are commonly called reflexive pronouns, and are usually compounded with -self.

Reflex Nervous Action, in physiology, those actions of the nervous system whereby

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an impression is transmitted along sensory nerves to a nerve center, from which again it is reflected to a motor nerve, and so calls into play some muscle whereby movements are produced. These actions are performed involuntarily, and often unconsciously, as the contraction of the pupil of the eye when exposed to strong light. See NERVE.

Reform Acts, a term applied to certain acts of the British Parliament by which the regulations as to the parliamentary representation of the people were altered, and especially to those of 1832, 1867, and 1884-1885. The first two acts provided both for an extension of the franchise and for a redistribution of seats. The Reform Act of 1832 disfranchised 56 rotten boroughs with less than 2,000 inhabitants each, and returning 111 members; 30 boroughs with less than 4,000 inhabitants, and two above that number, lost each a member, and thus 143 seats were obtained for distribution. Forty-three new boroughs were created, 22 of which received two members each, and 21 one member each. The county members for England and Wales were increased from 95 to 159, 26 of the large counties being divided, and a third member given to seven important county constituencies. Scotch and Irish Acts followed; the Scotch representation, fixed by the Act of Union at 45 was raised to 53 (30 of them given to counties and 23 to cities and boroughs), and the Irish members, fixed by the Act of Union at 100, were increased to 105. The Reform Act of 1867 disfranchised 11 small English boroughs, took a member from 35 more, and two from Scotch counties, which, with four seats obtained from boroughs disfranchised for corruption, gave 52 seats for redistribution. Five of these were given to as many large English and Scotch boroughs on the three-cornered system, and three to universities, the others to old or new county or borough divisions. Seven members were added to Scotland. There was no redistribution in Ireland. In the third successful effort for parliamentary reform, that of 1884-1885, the franchise and redistribution of seats constituted two distinct acts. The franchise bill received the royal assent on Dec. 6, 1884, and came into operation on Jan. 1, 1885. It established household and lodger franchise in the counties, introduced a service franchise, diminished, though it did not destroy, fagot voting, and made a uniform occupation franchise of \$50 rent both in counties and in boroughs in place of the three formerly existing. It left untouched the 40-shilling freeholders of inheritance, and conferred votes on copyholders possessing land of greater value than \$25 annually. By the Redistribution Act of 1885, 81 English, 2 Scotch, and 22 Irish boroughs were totally disfranchised; 36 English and 3 Irish boroughs, each

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lost a member, as did two English counties; the City of London was reduced from four to two; six seats were obtained from places disfranchised for corruption, and the members of the House of Commons were increased by 12. The seats thus obtained for redistribution were 180. The great feature of the scheme which followed (agreed to after a conference between the two great political parties) was the separation of populous boroughs and counties into divisions, each returning a single member. Only a few places hitherto with two members were left with the old arrangement. England has now 465 members, Wales 30, Scotland 72, and Ireland 103, the reduction from 105 occurring through the disfranchisement of Sligo and Cashel some years ago for corruption.

Reformation. The religious revolution of the 16th century, known as the Reformation, is the greatest event in the history of civilization since Paganism gave place to Christianity as the faith of the leading nations of the world. It marks the supreme importance of this revolution that the age which preceded and the age which followed it belong to two different phases of the human spirit. With the Reformation begins what is distinctively known as Modern Europe, while the epoch that preceded it bears the equally distinctive designation of the Middle Ages. In the articles on Luther, Charles V., Henry VIII., Calvin, Knox, and others details will be found regarding the aims and methods of the revolution in the various countries where it declared itself. Here, therefore, it will be sufficient to indicate briefly the general causes which produced it, the special course and character it took among the different peoples, and its chief results for the human spirit at large.

The central fact of the Reformation was the detachment from papal Christianity of the nations distinguished by the general name of Protestant. By this severance an order of things came to an end under which Christian Europe had been content to exist from the close of the 8th century. From the year 800, when, by a mutual understanding of their respective functions, Charlemagne was crowned emperor of the Romans by Pope Leo III., Western Europe had come to regard the papacy as the essential condition of individual and corporate life, as prime a necessity in human affairs as the sun in the course of nature. Thus conceived, the power of the Church underlay all human relations. It was the consecration of the Church that constituted the family; the Church defined the relations of rulers and their subjects, and the Church was the final court of appeal on the ultimate questions of human life and destiny. In the nature of things such a power could never be realized as it was ideally conceived. Yet

during the 11th and 12th centuries, the period when the power of the Popes was most adequate to their claims, they undoubtedly went far to make the idea a reality. But the energies of the human spirit were bound sooner or later to issue in developments with which mediæval conceptions were fundamentally irreconcilable. By the 13th century, along every line of man's activity, there were already protests, conscious and unconscious, against the system typified in the Pope at Rome.

The most remarkable of these protests was the order of ideas associated with the name of Joachim of Floris in Calabria (died 1202). Under the name of the "Eternal Gospel" (used for the first time in 1254) these ideas ran a course which for a time seriously threatened the existence of the mediæval Church. The new teaching struck at the very root of the papal system, for its essence was that the hour had come when a new dispensation, that of the Holy Spirit, should supersede the provisional Gospel delivered by Christ. During the second half of the 13th and the first half of the 14th century the influence of these ideas is traceable in every country of Christendom, and it was only the unflinching action of the Church that postponed its disintegration for other three centuries. The numerous sects which either sprang from or were quickened by this movement speak clearly to the revolutionary fever that had seized on men's spirits and was impelling them to other ideals than the traditions of Rome. Mainly the offspring of the third order of St. Francis, these sects swarmed throughout every Christian country under the names of Beguins, Beghards, Fratricelli, Flagellants, Lollards, Apostolic Brethren, etc., and everywhere spread discontent with the existing Church. Even John Knox (in answer to a letter by James Tyrie, a Scottish Jesuit) claims Joachim of Floris as an ally in the work which it was the labor of his own life to achieve—the ruin of the papacy, and the promotion of what he deemed a purer Gospel.

Simultaneously with this manifestation of revolutionary feeling there were tendencies in the sphere of pure thought in essential antagonism to the teaching of the Church. The labor of the thinkers of the Middle Ages was to reconcile faith, as inculcated by religious authority, with human reason as they found it embodied in the accessible writings of Aristotle. In the 13th century, however, the Arabic texts of Aristotle, and notably that of the great commentator Averrhoes, made their way into the Christian schools, and thenceforward a leaven of skepticism was a present element in all the universities of Europe. As the result of the teaching of Averrhoes, a name of the most sinister import to every

true son of the Church, materialism and pantheism became common creeds among thinkers, and the notion spread even among intelligent laymen that Christianity was not the absolute thing the Church had taught them to believe. In Dante's (died 1321) fierce exclamation that the knife is the one reply to him who denies the immortality of the soul we have the outburst of a passionate faith in presence of a widespread libertinism of thought.

But the most serious menace against the integrity of the papal system lay in the political development of Europe during the last three centuries of the Middle Ages. As the countries of Western Europe became more and more individualized, their peoples grew every year into a fuller consciousness of distinct national interests and national ideals. While this was the tendency of the various nations, the Pope during these centuries gradually lost his position as the disinterested umpire of Europe, and sank into an Italian prince, with a temporal policy of his own which led him to seek allies among other potentates as they fell in with his own special ends of the moment. But such alliances naturally gave offense to the princes excluded from them, and led to a suspicious discontent with the Roman see, which, as was afterward proved in the case of England, needed only the requisite occasion to flame into outright rebellion. The saying of Philip Augustus (died 1223)—"Happy Saladin, who has no Pope!"—expressed the feeling, which every century grew stronger, that the Pope would become an impossible factor in European politics. To this feeling should be added the fact that, as the middle classes grew in intelligence and well-being, they looked with envy on the immense wealth of the clergy, and grumbled at the large sums that annually went to the coffers of Rome.

During the 14th and 15th centuries mediævalism gave every sign of an exhausted phase of human development. By the so-called Babylonish Captivity, when the papal residence was fixed for many years at Avignon (1309-1377), and by the Great Schism (1378-1417), during which the spectacle was seen of first two and afterward three Popes claiming to be the vicars of God on earth, the papacy suffered a loss of prestige in the eyes of all Europe which it never afterward fully recovered. It was the further misfortune of the Church during this eclipse of its ancient glory that all spiritual life seemed to have gone out of every rank of its clergy. Testimonies from every country prove beyond question that by the end of the 15th century the clergy had become grossly unfit to be the spiritual guides of the people. The sources of intellectual life had equally failed wherever the old philosophy authorized by the Church con-

tinued to be the subject of teaching and study. In the later half of the 15th century scholasticism had become the veriest trifling which ever engaged the mind of man. In all the interests of man's well-being, therefore, a renaissance was needed to evoke new motives and supply new ideals which should lift humanity to a higher plane of endeavor. Such a renaissance came and fortunately the Church did not prove equal to suppressing this second burst of life as it had suppressed that of the 12th and 13th centuries.

It was again in Italy that the new life first declared itself. While N. of the Alps scholasticism reigned in all the schools, the movement known as the Renaissance had in Italy been in full course for above a century. In itself the Renaissance was as far as possible from leading men to higher ideals in religion; yet in two of its results it gave a direct impetus to the Reformation. Inspired by the life of antiquity, the humanism of the Renaissance paganized the Church and quickened that moral disintegration which was the prime cause of the religious revolution. On the other hand, through its opening of men's minds by new studies, and new measures of things, the Renaissance lightened the load of tradition, and made a new departure in the life of Christendom a less formidable conception. In Erasmus (1467-1536), who has always been regarded as a true nursing father of the Reformation, we clearly discern these two results of the revival of the ancient literatures. In so many words he states his grave fears lest the Church should be wholly paganized by the universal imitation of classical modes of thought and speech; while his own unsparing criticism of the Church and its traditions proves how much he owed to the so-called "new learning."

The very zeal with which the revival of antiquity was pursued in Italy was itself a countercheck to religious reform in the country that of all others needed it the most. All contemporary literature proves that during the later part of the 15th and the opening of the 16th century the court of Rome was as profoundly immoral as that of any of the heathen emperors had been in the same city. The spiritual claims of the papacy were the jest of ecclesiastics themselves. "This fable of Christ," a certain dignitary of the Church is reported to have said in the Vatican, "has been to us a source of great gain." Among the Italian people, however, there was never the slightest indication of a national movement toward any serious breach with the papacy. The religious melodrama enacted by Savonarola at Florence (1489-1498) never struck at the central ideas of papal Christianity; and Savonarola, besides, never like Luther

or Knox woke a deep response in the national consciousness. While in Italy, therefore, there was no widespread religious quickening as in other countries of Christendom, there was no political reason such as elsewhere produced a breach with the papacy. For the Italian people the Pope was not a foreign prince with temporal interests of his own conflicting with those of the nation at large. The different republics which partitioned the country might at times regard the Pope as an enemy to their individual ambitions; but the nation as a whole was fully conscious of the honor of having the vicar of God in their midst, and as in the past they had stood by him against the emperors, so in the great religious revolution of the 16th century they also remained faithful to him throughout the gradual dismemberment of his spiritual dominion.

Of the countries N. of the Alps Germany was the first to be widely influenced by that revival of learning which had its origin in Italy. In Germany, however, the new spirit wrought under fundamentally different conditions, and lighted the way to vastly different issues. There was every reason why Germany should lead the way in the schism from Rome. Outside Italy Germany was the country where every abuse of the mediæval Church was seen in its grossest form. The ignorance and sensuality of the clergy, the scandalous sale of livings, the disproportionate papal exactions — all these evils came to be vividly realized by the quickened consciousness of the nation. Between Rome and Germany, moreover, an antagonism existed in the very conditions from which mediævalism had sprung. It was in virtue of the mutual understanding between Pope and emperor that the Church came to fill the place it did in Western Europe. But almost from the first interests of Rome and the empire had been in collision, so that Pope and emperor came to be mere rivals for the first place among the Western powers. It was natural, therefore, that in Germany Rome should be regarded with a jealousy and suspicion which might easily grow into irreconcilable hostility.

These workings of the national mind found intensified expression in the acts and writings of Martin Luther, who, with a genius and audacity which have given him a place among the molders of man's destinies, proclaimed the need of a new departure in the religious life of humanity. In rejecting the traditional claims of the papacy Luther at the same time supplied a new principle by which, as he contended, a higher and truer life of the soul might be lived. By his doctrine of Justification by Faith Luther threw each individual on his own responsibility for the reason and life

which is intrusted to him. Hitherto the deepest concerns of men had been inextricably bound up with Pope and priest, and in this had lain the essential principle of mediæval Christianity. By the new principle Luther made the Pope no longer an indispensable factor in individual or corporate life, and thus initiated a new phase in the development of society. As was to be expected, this principle, so organic in its working, cleft the German nation in twain, and gave rise to a struggle which did not close till more than a century after the death of Luther himself. Luther's attack on the sale of indulgences (1517), the burning of the papal bull (1520), Luther's condemnation by the Emperor Charles V. at the diet of Worms (1521), his temporary triumph at the first diet of Spire in 1526 (the beginning of modern Germany, according to Ranke), the confession of the Protestant faith at Augsburg (1530), are the outstanding events in the contest closed by the peace of Augsburg in 1555, nine years after Luther's own death, but again renewed in the disastrous Thirty Years' War (1618-1648), and finally settled by the peace of Westphalia (1648).

The religious revolt of Germany left no country of Christendom unmoved. Before the 16th century had closed the bulk of the Teutonic peoples had followed her example and broken with the papacy. Under one aspect, indeed, the Reformation may almost be regarded as a Teutonic revolt against the domination of the Latin races. Between 1525 and 1560 Denmark and Sweden, taking the occasion of a political revolution, both declared for Protestantism; and in 1581, the United Provinces definitively threw off their double allegiance to Spain and the Pope. But it is more important to trace the course of the revolution in the great powers of the West.

In Spain heresy of all kinds had no chance of finding a home. In its terrible Inquisition, reorganized in 1478, it had an institution ready made for effectually dealing with all attempts at reform or revolution. Luther found followers in Spain as in other countries; but they were literally extinguished before their voices could be heard, and of all the great powers Spain profited least by the quickening spirit of the Reformation.

Much more interesting and important is the history of religious reform in France. Between 1520 and 1530, the period of Luther's greatest activity, both renaissance and reform found a firm footing in France, and so many circumstances seemed to favor the future of both that for a time it was doubtful with which side the victory would eventually lie. On the one side was the University of Paris, which throughout the Middle Ages had claimed for itself the right

—denied to the Pope himself—of sovereign decree on the truth or falsity of all religious doctrine. As its decrees had in every case the strenuous support of the Parliament of Paris, the university was a formidable force to be reckoned with by every innovator in studies or religion. In 1519 Luther's dispute with Eck had been referred to the doctors of Paris for decision, and their judgment, delayed for two years, had been the unqualified censure of Luther's position. Thenceforward every advocate of the new religion, and they daily grew in numbers, especially among the middle class, both in Paris and in the provinces, was pursued by the unrelenting hate of the Parliament and the university. On the other hand, the king (Francis I.), eagerly encouraged by his famous sister, Margaret of Navarre, who herself had strong Protestant leanings, was at first disposed to use the new religious movement as a weapon to his hand in his dealings with the court of Rome. In the end Francis saw that separation from Rome meant the disruption of the French nation, and after 1534 he resolutely set himself to the extermination of every heretic in his dominions. His son and successor, Henry II. (1547-1559), carried out this policy with even greater rigor, but in spite of all efforts to suppress them the French Protestants grew into a body formidable alike by their position, wealth, and intelligence. The Huguenot wars, the massacre of St. Bartholomew (1572), and the Edict of Nantes (1598), are the outstanding events in this long struggle, which, involving political as well as religious questions of the first importance, threatened the very existence of France by suggesting to Philip II. the possibility of annexing the divided country as a province of Spain. By the Edict of Nantes the French Protestants attained a certain measure of religious freedom; by its revocation in 1685 Protestantism was stamped out of the country, and France thus deprived of the noblest elements in its society.

The religious revolution in Switzerland is second only to that of Germany in its direct influence on the subsequent fortunes of the European nations. In Switzerland we have the case of a double revolt from Rome springing from the same conditions, yet each having a character and an animating soul of its own. At Zurich, as early as 1519, and independently of Luther, Ulrich Zwingli, who, according to Ranke, combined in himself the best elements of renaissance and reform, gave rise to a movement which split the Swiss cantons into two hostile sections, and issued in the peace of Cappel (1531), which permitted to each canton the choice of its own form of faith. More important than the movement of Zwingli at Zurich is that associated with Calvin and Geneva.

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As in almost every other case of revolt, political considerations wrought with religious zeal in the breach of Geneva with Rome. Before 1530 the town had received the new religion from French refugees, who thus gave its peculiar character to the creed eventually associated with Calvin and Geneva. But it was in the successful effort of the town in throwing off the yoke of the Catholic Dukes of Savoy (1534) that it found itself forced to join the great Protestant schism, and to fashion a civil and religious polity compatible with an independent corporate life. It was in the accomplishment of this task that Calvin proved himself the great consolidator of the tendencies that underlay the Protestant movement. Inspired by Calvin, it was the pre-eminent destiny of Geneva at once to produce a reasoned civil and religious creed and a type of Christian believer that offered a solid front against the vast powers still at the command of the Roman see, and assured to Protestantism its own independent course in the history of mankind.

In 1532 the schism of England from Rome also became an accomplished fact. In this result had issued the negotiations of Henry VIII. with Pope Clement VII. for his divorce from Catharine of Aragon. But the view summed up in Gray's line, "And gospel light first dawned from Bullen's eyes," implies a totally inadequate recognition of the many forces that went to produce the English Reformation. The king's divorce was the mere occasion of what must sooner or later have been the only solution of England's relations with the popedom. In England all the forces, in greater or less degree, were at work which had produced the religious revolutions in Germany. As in Germany, the Church alike in its teaching and practice no longer represented the highest consciousness of the nation. It has of late been shown that its degradation was far from being so general or so complete as the official reports of Henry had seemed to prove; yet the state to which it had come was clearly such as to lend some countenance to the most drastic measures against it. By the end of the 15th century, also, the Renaissance, which was everywhere the solvent of tradition, had found its representatives in England. Linacre, Grocyn, Colet, and Sir Thomas More were all men more or less emancipated from mediævalism, though none of them broke communion with Rome. Both More and Colet spoke their minds freely on the unworthy lives of the clergy; and the latter by his foundation of St. Paul's School in 1510, and by his placing it under lay supervision, took a step of the highest importance in the direction of the new order. But it is in the political development of England that we find the adequate explanation of her final

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breach with Rome. For centuries the Pope had come to be more and more regarded as a foreign prince, whose powers, as he claimed the right to exercise them over Englishmen and English property, were incompatible with English interests and English liberty. Moreover, by the date of Henry's accession the Pope was a mere Italian prince, whose own interests led him to seek the support of the strongest arm. When Clement VII., therefore, declared against the divorce from Catharine, Henry regarded the decision not as the oracle of Christendom, but as the counsel of an earthly prince whose own interests left him no other alternative.

The breach with Rome was thus inevitable; but it still remained to be settled whether the old or the new religion should finally gain the English people. Henry himself to the close of his life professed to have broken with the old only in the one point of the headship of the Church. In the reign of Edward VI. a clear departure was made from the doctrinal system of the ancient Church; but the temporary reaction under Mary showed how strong a hold that system still possessed on the hearts of the people. When Elizabeth came to the throne in 1558 it was only her prudent policy that saved the country from the internecine divisions of France and Germany. Three parties were equally bent on realizing their own conceptions of a religious settlement. The adherents of the old religion, who still probably made a half of the people, had not lost hope of a return to the old spiritual allegiance. Those who had renounced the papacy themselves made two distinct parties, each bent on ends so conflicting, that it was evident from the first that they could never work in common. The governing principle of the one party, from which eventually sprang the Church of England, was to minimize the differences between the old faith and the new, and as far as possible to maintain the continuity of the religious tradition in the country. The other, which drew its inspiration from Calvin and Geneva, and was afterward known as the Puritan party, aimed at a root and branch rejection of papal Christianity as at once in the interest of what they thought a purer creed, and as the only safeguard against a return to the old constitution. It was owing to her politic handling of these conflicting parties that at Elizabeth's death England was of one mind regarding the question of the papal supremacy, and that the severance from Rome became a definitive fact in the development of the country. By happy turns of events, such as her excommunication by Pius V. in 1570, and by the extraordinary issue of the Spanish Armada in 1588, not only was the number of Catholics reduced, but such as

still clung to the ancient faith thenceforward put their allegiance to their native prince before any claim of the Roman see. It was this final triumph of the Protestant revolution in England that saved the movement in all the other countries of Europe.

The triumph of the Protestant movement in Scotland is likewise a fact of the first importance in European history. In Scotland, from the very beginning of Luther's revolt, we find the presence of the same elements which elsewhere led to revolution. As in other countries, the Scotch clergy had lost the respect of the country. As early as 1525 Lutheran books were so widely read that an act of Parliament was passed forbidding their importation. The very efforts of the Church to stamp out the new heresy, as in the burning of Patrick Hamilton in 1528, and of George Wishart in 1546, served only to hasten the turn of affairs which it had dreaded. Jealousy of the wealth and political influence of the clergy disposed the nobility to throw in their lot with the party of revolution. When in 1559 Knox returned from his long sojourn abroad, his unflinching zeal and personal force supplied the momentum that was needed to complete a revolution already in full course; and in the following year Protestantism was formally established as the religion of the country. The consequences of this revolution extended far beyond Scotland. Had Mary on her return in 1561 found Scotland united in the Catholic faith, she would have commanded the destinies of England. Elizabeth could never have effected a religious settlement, and, with England paralyzed, Protestantism could not have held its own against the united forces of Catholicism.

Thus, by the middle of the 16th century, it seemed as if the revolution must sweep all before it, and the papal system be as completely effaced by Protestantism as paganism had been effaced by Christianity. At the beginning of the revolt the authorities of the ancient Church did not fully realize that the forces arrayed against them menaced their very existence. When the true extent of the danger was realized the Church displayed all the resources of an institution whose roots were in the very heart of Christendom, and which, alike by its traditions and by its special adaptations to the wants of the human spirit appealed to the deepest instincts of a large section of all the peoples of Western Europe. The Society of Jesus, founded in 1540, supplied an army of enthusiasts, whose policy and devotion saved Rome from dissolution. By the decrees of the Council of Trent (1545-1563), inspired by the spirit and aims of the Jesuits, the Church reaffirmed its traditional teaching, conceding nothing either to renaissance or reform; and a succession

of Popes during the later half of the 16th century carried out with the zeal worthy of the better ages of the papacy the policy marked out for them by the Jesuits. Through the disunion of the Protestants and the strenuous efforts of the papacy, the middle of the 16th century saw the tide of revolution checked; and in certain countries, more especially in Germany, the Jesuits even gained ground which had been lost. By the close of the same century Europe was portioned between the two religions almost by the same dividing lines as exist at the present day.

It has been said that the central fact of the religious revolution of the 16th century was the severance of the Protestant nations from the Roman see; but the great schism inevitably led to issues of which the Protestant reformers never dreamed, and which they would have denounced in as unqualified terms as any theologian of the mediæval Church. The reform of religion preached by Luther or Calvin implied no real change in the modes of thought that distinguished mediævalism. Their theology was but another form of scholasticism; their attitude to the classical tradition or to any departure from their own conception of the scheme of things was precisely that of the Schoolmen trained on the Decretals and Aristotle. For an infallible Church they substituted the Bible as the unerring expression of God's relation to man; the interpretation of the Bible they left to the individual consciousness. This freedom was of necessity only nominal, since the members of any Protestant Church were members only on condition of their accepting the Church's interpretation of the contents of the Bible, and since each different Church deemed itself the special depositary of the only true conception of the perfect will of God. Nevertheless, it was from this attitude of the Protestant reformers to the Bible that the developments of modern thought sprang. A reformer like John Knox would have stamped out every form of thought hostile to his own synthesis of things divine and human; but it was not in the power of the Protestant system to do what had been so effectually done by the Church of the Middle Ages. In the mediæval conception Church and state made one organism; what menaced the life of the one menaced the life of the other. Hence the state was at the Church's bidding whenever its arm was needed to deal with any suggestion of heresy. But having no great central head, such an organic union was impossible for any Protestant Church, and religious error could not be regarded as a crime against the existing government. So complete was the revolution wrought by this changed relation of Church and state that toleration of different creeds, and not

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an iron uniformity, was in time seen to be the indispensable condition of civil society. But in this lies the fundamental distinction between mediævalism and the modern spirit. Mediævalism rested on the belief that society was threatened if any of its members questioned the body of truth of which the Church was the custodier; it is the distinctive principle of the modern spirit that truth shall be followed wherever facts are believed to lead.

Reformatory Schools, schools instituted for the training of juvenile offenders who have been convicted of an offense punishable by imprisonment. The first reformatory managed under legislative control was the one established in New York in 1824, known as the New York House of Refuge. Its success was so marked that at present there are 56 institutions in the United States for the reformation of juvenile offenders. See JUVENILE OFFENDERS.

Reformed Church, the name given first to the Helvetic Church, which rejected both transubstantiation and consubstantiation, regarding the communion as simply a commemorative ordinance. Afterward, the name Reformed Churches was extended to all other religious bodies who held similar sacramental views. The founder of the Helvetic Church was Ulrich Zwingli, who began to preach reformed doctrines in 1516, and in 1519 engaged in a contest with Samson, a seller of indulgencies. D'Aubigné, himself a Swiss, shows that from 1519 to 1526 Zurich was the center of the Swiss Reformation, which was then entirely German, and was propagated in the E. and N. parts of the Helvetic Confederation. Between 1526 and 1532 the movement was communicated from Berne; it was at once German and French, and extended to the center of Switzerland from the gorges of the Jura to the deepest valleys of the Alps. In 1532 Geneva took the lead. Here the Reformation was essentially French. The first or German part of the movement was conducted by Zwingli, till his death at the battle of Cappel (Oct. 11, 1531), the second by various reformers, the third part by William Farel, and then by John Calvin. During the 18th and 19th centuries rationalism extensively pervaded the Swiss Church.

Reformed Church, a religious body in the United States, whose designation has been changed from that of its progenitor, the Reformed Protestant Dutch Church, which arose in the Netherlands early in the 16th century and attained its form and organization during the struggle against Philip II. under the leadership of the princes of Orange. The Church was introduced into America early in that century. Public worship was commenced at New Amsterdam

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in 1643. After the surrender of New Amsterdam to the English in 1664 the growth of the Church was slow. The Dutch language was used exclusively in worship down to 1763. About the middle of the 18th century arose the noted *coetus* and *conferentie* controversy, which turned on the question of dependence of the Church of Holland. An independent Church organization was effected in 1771. From 1817 to 1857 the Reformed Church coöperated with other bodies in supporting foreign missions; and from 1836 with the American Board. In 1857 an amicable separation from the latter was effected, and the missions of Amoy and Arcot were transferred to the Reformed Church. The doctrinal standards of the Church are: (1) the Belgic confession of faith; (2) the Heidelberg catechism; (3) the canons of the Synod of Dort. The synod of 1874 adopted a revised liturgy, the use of which is optional. The government of the Church is according to the Genevan model. The officers are ministers, elders, and deacons, who compose the consistory, to which the government of the individual church belongs. The classis, consisting of the ministers within a certain district and one elder delegated from each church, corresponds to the presbytery in the Presbyterian Church. The particular synods, of which there are four, New York, Albany, New Brunswick, and Chicago, are delegated bodies composed of four ministers and four elders from each classis within the bounds of each synod. These are courts of appeal from the decisions of the classis. The general synod is the highest court of appeal, and exercises a general supervisory power over the Church. It is composed of three ministers and three elders from each classis. In 1867 the word "Dutch" was dropped from the corporate name of the body. "The Christian Intelligencer," a weekly journal devoted to the interests of the Church, was established in New York, 1828. There are two theological seminaries, one at New Brunswick, N. J., the other in connection with Hope College, at Holland, Mich. Statistics, 1910: Churches, 684; ministers, 727; members, 116,174.

Reformed Church in the United States, formerly German Reformed Church in the United States of America, an offshoot of the Reformed Church of Germany. The first minister was the Rev. George Michael Weise, who emigrated with about 400 people of the Palatinate in 1727, and settled in Pennsylvania, E. of the Susquehanna. In 1746 the Rev. Michael Schlatter was commissioned by the synods of North and South Holland to visit their German missions in America, and regulate their relations. He assembled in Philadelphia the first synod or *coetus* of the German Reform-

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ed Church, 1747. The German Reformed *coetus* continued under the jurisdiction of the Church of Holland till 1793, when an independent synod was formed. It increased rapidly in membership and congregations. The first triennial general synod, with jurisdiction over the whole Church, met in Pittsburg, 1863. The general synod of 1869 resolved to drop the word "German" from the title of the Church. The Heidelberg catechism is the only standard of doctrine. The worship of the Church is liturgical; its government is presbyterian. Reception into the full communion of the Church takes place by the rite of confirmation. Christmas, Good Friday, Easter, and Whitsunday are observed with much solemnity. Eleven English and five German papers are published in the interest of the Church; and there are 16 theological and literary institutions under its control. Statistics, 1910: Churches, 1,737; ministers, 1,230; members, 293,836.

Reformed Episcopal Church, a denomination organized by members of the Protestant Episcopal Church, who give substantially the following statement of the events and circumstances which, as they believe, justify their course: (1) The Protestant Reformation in England had outwardly a political origin, (in the act of the king, Henry VIII., renouncing allegiance to the Pope, and proclaiming himself head of the English Church), by which the work was biased and cut short. During the brief life of the young king, Edward VI., the regent, or protector, being in favor of the Reformation, great progress in it was made. Under Mary the supremacy of the Pope was again acknowledged. When Elizabeth became queen, wishing to harmonize her divided subjects, and hoping for reconciliation with Rome, she strove to have the liturgy framed so as to satisfy both parties. Consequently it contained contradictory elements. At a later period, when she had found her hope futile, the articles of faith adopted were decidedly Protestant. Thus it came to pass that in the Church of England two parties found support in her ritual; the one Protestant, the other having an affinity with Rome. (2) After the American Revolution, when the Church of England in the colonies became the Protestant Episcopal Church of the United States, the Book of Common Prayer, having been adopted without material alterations, retained its conflicting elements. (3) The Tractarian movement, which began at Oxford, 1833, was a successful endeavor to revive the principles of antiquity and Catholicity contained in the prayer book, in opposition to its Protestant elements. It discarded Protestant principles and taught the doctrines of apostolic succession, priestly absolution, baptismal regeneration, the real presence, and the au-

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thority of the Church. (4) These teachings produced a powerful effect in the United States also. A great increase in ritualism, and of the drift toward Rome, was soon manifested; the opposition between the "High" and the "Low Church" parties was intensified, and practical measures were adopted by each which widened the chasm. (5) Several subsequent public events fanned the flame of discontent, especially the censure of one clergyman for preaching in a Methodist Church, and the suspension of another for omitting the word "regenerate" in the baptismal office. (6) Remonstrances and petitions for relief, which were numerous and urgently presented to the General Convention, produced no effect. (7) During the sessions of the Evangelical Alliance in New York in October, 1873, Bishop Cummins of the diocese of Kentucky, having, by invitation, officiated at a union celebration of the Lord's Supper, in company with representatives of other denominations, was for this act of Christian fellowship bitterly censured through the press by members of the "High Church" party. After this, convinced that he could no longer rightfully continue in a church whose theory and practice (as interpreted by the majority of its members) denied the brotherhood of believers in Christ, Bishop Cummins withdrew from the ministry of the Protestant Episcopal Church. (8) This led to the organization, Dec. 2, 1873, of the Reformed Episcopal Church, of which Bishop Cummins and the Rev. Dr. Charles E. Cheney were elected bishops. At the same time the following declaration of principles was adopted: I. The Reformed Episcopal Church "holding the faith once delivered to the saints" declares its belief in the Holy Scriptures of the Old and New Testaments as the Word of God, and the sole rule of faith and practice; in the creed "commonly called the Apostles' Creed"; in the divine institution of the sacraments of baptism and the Lord's Supper; and in the doctrines of grace substantially as they are set forth in the Thirty-nine Articles of Religion. II. This Church, recognizes and adheres to Episcopacy, not as of divine right, but as a very ancient and desirable form of Church polity. III. This Church, retaining a liturgy which shall not be imperative or repressive of freedom in prayer, accepts the Book of Common Prayer, as it was revised, proposed, and recommended for use by the General Convention of the Protestant Church, 1785; reserving full liberty to alter, abridge, enlarge, and amend the same as may seem most conducive to the edification of the people, "provided that the substance of the faith be kept entire." IV. This Church condemns and rejects the following erroneous and strange doctrines as contrary to God's word: (1) That the Church of Christ

exists only in one order or form of ecclesiastical polity. (2) That Christian ministers are "priests" in another sense than that in which all believers are "a royal priesthood." (3) That the Lord's table is an altar on which the oblation of the body and blood of Christ is offered anew to the Father. (4) That the presence of Christ in the Lord's Supper is a presence in the elements of bread and wine. (5) That regeneration is inseparably connected with baptism. To this statement it may be added that in this Church the bishops do not constitute a separate order, but are presbyters; in council they vote with and as their brother presbyters, and are subject to confirmation or appointment by the general council. Statistics, 1910: Churches, 80; ministers, 94; members, 9,610.

Reformed Presbyterian Church, or Cameronians, a body of Christians who profess to hold the principles of the Church of Scotland at the period of the second Reformation, between 1638 and 1650. They claim to be the legitimate successors of that section of the Covenanters which was headed by Cameron and Cargill, who considered that Charles II. had forfeited all title to their allegiance, having broken the solemn vows which he made at his coronation. When William of Orange was called to the throne in 1688 they were among the first to welcome him; but while they avowed their readiness to yield all loyal obedience and submission they openly declared their dissatisfaction with the Revolution settlement. In 1690 Presbyterianism was established in Scotland, but because the state claimed a certain control over the Church this settlement was also repudiated by the Reformed Presbyterians. The position which the sect was thus compelled to occupy was that of dissenters from the Church and protesters against the state. For upward of 16 years after they had publicly avowed their principles they remained in an unorganized condition and without a regular ministry. The first who exercised this office was the Rev. John McMillan, who in 1706 demitted his charge as parish minister of Balmaghie, and in 1743 he met with a coadjutor in the Rev. Thomas Nairne, whereupon these two constituted a Reformed presbytery in 1743. In 1810 three presbyteries were formed, and in 1811 a synod was constituted. The number of presbyteries was afterward increased to six, and the number of ministers rose to about 40. In 1876 a large portion of them united with the Free Church of Scotland. The Reformed Presbyterians in the United States in 1910 were divided into five bodies, the Synod being chief.

Refraction. When a beam of light, traveling in a transparent medium, impinges obliquely upon the surface of an-

other transparent medium, what occurs in the vast majority of cases is that a part of it is reflected (see REFLECTION) and a part of it enters the second medium, but in so doing is "refracted" or bent out of its former course. If, for example, the light travel in air and impinge obliquely on glass, the course of the refracted portion is bent so that the refracted light travels more directly or less obliquely through the glass; and, conversely, if the light travel in glass and impinge on an air surface, the portion which is refracted into the air will travel through the air more obliquely with respect to the refracting surface than the original light had approached it. The law of refraction was discovered by Snell in 1621, and is the following: The refracted ray is in the same plane with the incident and the reflected ray, and is therefore in the "plane of incidence," and the sine of the angle of incidence bears to the sine of the angle of refraction a ratio which remains constant, for any two media, whatever be the angle of incidence.

In fig. 1 a ray, AO, impinges on a denser medium at O; the angle of incidence is AON (ON being at right angles to the refracting surface); the refracted ray, instead of going on toward a' , is bent so as to pass through A'. Draw a circle cutting AO and OA' in c and c' ; draw cd and $c'd'$ at right angles to NN'; these lines, cd and $c'd'$, are, for the radius Oc, the sines of the re-

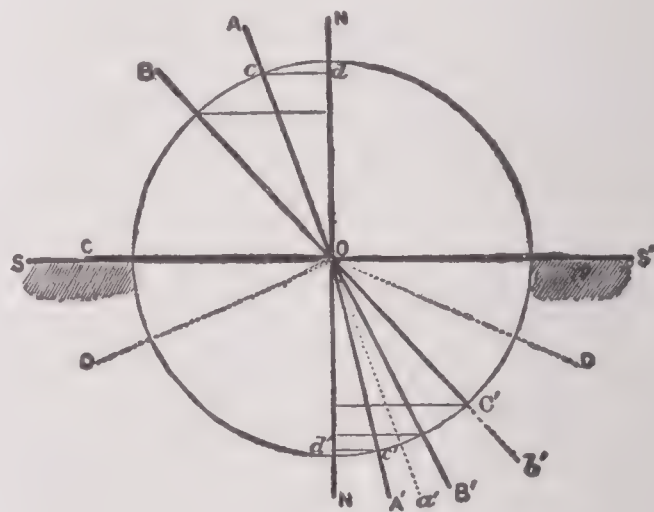


FIG. 1.

spective angles AON and A'ON'. These sines bear to one another a certain proportion, ascertained by measurement; let it be 3 : 2; then Snell's law is that any other ray, say from B, will be so refracted that the sines, similarly drawn, will bear to one another the same proportion of 3 : 2. Between air and water the ratio of these sines is almost exactly 4 : 3; between air and crown glass it is nearly 3 : 2. Now observation shows that light passing from water into crown glass is so refracted that the sines have the ratio $\frac{3}{2} : \frac{4}{3}$, or 9 : 8, so that the rays are less bent than when they

pass from air into any of these media. The ratio of these sines when air is one of the pair of media involved is called the "refractive index" of the other medium; thus, water has, for sodium monochromatic light and at 18° C., a refractive index of 1.3336, and crown glass one of 1.5396; and the ratio of these refractive indices, ascertained with respect to air, governs the ratio of the sines, whether air be one of the pair of media experimented on or not. A direct consequence of this is that, if light pass successively, say, through air, glass, and water, the ultimate deviation will be the same as if the glass had been absent; and so for any number of intervening terms, it being always assumed that the bounding surfaces are parallel to one another; and if a parallel beam of light, passing through air, come to traverse any number of parallel refracting surfaces, and if it regain the air, it will be found to travel parallel to, if not directly in, its original course.

The observed fact that light is differently bent in its course by different refracting media shows that there is a difference between bodies in their power of receiving light through their bounding surfaces. Newton, in accordance with his corpuscular theory, interpreted this as showing that when the luminous corpuscles come very near the surface of a denser substance they are as it were jerked or made to swerve out of an oblique path and hurried in by the attraction of the denser substance so as to enter that substance more directly; and that when the light quits the denser substance it is retarded by a similar attraction. The consequence of this would be that light would travel in the denser medium perhaps not appreciably faster than in air, but with a mean velocity certainly not less. On the undulatory theory, however, refraction is a necessary consequence of a slower travel of ether-disturbances in the denser medium.

In fig. 2 A is a plane wave front, advancing obliquely toward B, the surface of a denser medium. At the end of a certain time the wave front is at A'; after an equal interval it is at A''. During the next equal interval a gradually diminishing breadth of the wave is traversing the original medium with the original velocity; but a steadily widening portion of the wave front enters the denser medium and is there hampered. At the end of the interval the aggregate disturbance, that is to say, the wave front, will be found to have swung round into the position and direction represented by *a*, just as a line of soldiers would tend to do on obliquely entering more difficult ground. During the next equal interval the wave front advances parallel to itself, but traverses smaller distances in equal times, so

that *aa'* is less than AA'. To this explanation it is essential that in optically denser media light should travel more slowly, and it has been absolutely established that this is the case. Optical density, so called, does not, however, always coincide with mass density; bisulphide of carbon, which is lighter than glass, has for sodium light a refractive index of 1.63, while crown glass has an index about 1.5, and flint glass one about 1.6. If the course of any ray between any two points in the two respective media be studied, it will be found that no other path between the two points could have been traversed in so short a time.

If we go back to fig. 1, and assume the rays to pass from A', B', etc., toward O, we find the rays emerging from the denser medium more nearly parallel to SS'; a ray from C', so far as it is refracted at all, emerges parallel to SS'; and for rays ap-

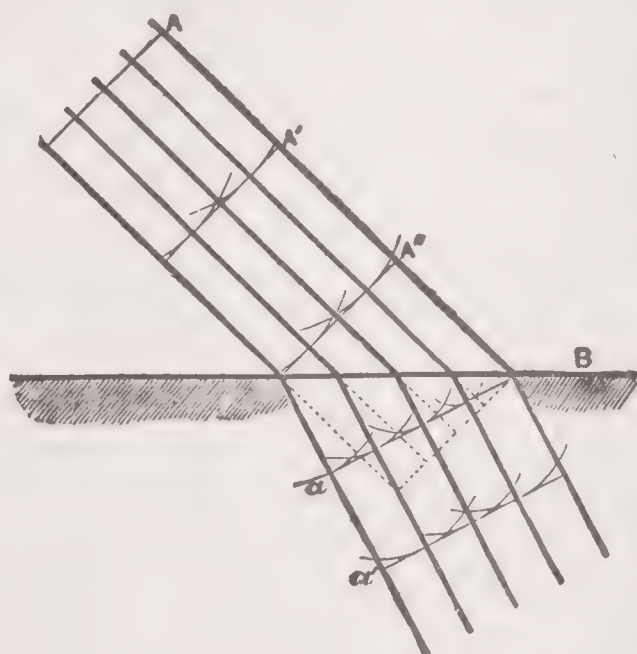


FIG. 2.

proaching O from points between C and S' the construction for the refracted ray becomes impossible. The angle C'ON' is the "critical angle," beyond which there is no refraction, but total reflection. This angle

is such that its sine is equal to $\frac{1}{\mu}$, where μ

is the ratio between the refractive indices of the denser and the rarer medium. For water and air it is, for sodium monochromatic light, 48° 27' 40". Where this ratio μ (the "relative index of refraction") is high, this critical angle is small and total reflection is well marked, as in the sparkle of the diamond.

When a spherical wave impinges on a plane surface it is modified into a hyperboloid, the center of curvature of the central portion of which is farther away than or nearer than the center of the sphere in the ratio of the refractive index of the

Refraction

second medium to that of the first. An eye within a rarer medium will thus see the image of a point situated within the denser medium as it were nearer than it really is; hence a stick appears bent when partly immersed obliquely in water; and, owing to differences in the amount of refraction at different angles, the bottom of a tank looked down upon appears sunk in the middle.

In fig. 3 light starts from a point X, and impinges directly on a spherical surface of a denser medium; the center of curvature of the spherical surface is at C. During a certain interval of time the front of the

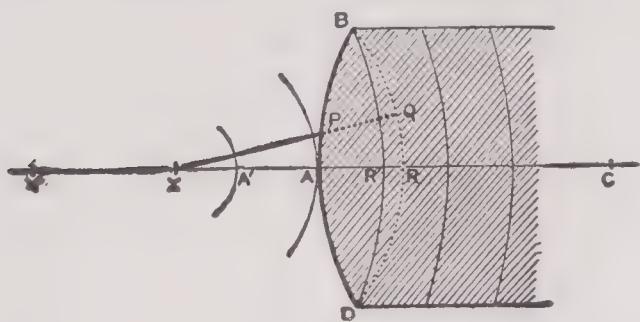


FIG. 3.

wave advances from A' to A; during the next equal interval it would, but for the denser medium, have been at BRD. It has not, however, got so far as R in the time; the central part of the wave front has only got as far as R', where $AR : AR' :: \mu : 1$. Any non-axial ray, such as XP, which would have reached Q, can only have originated a disturbance at P, which would have traveled from P in some direction to a distance not equal to PQ, but to PQ reduced in the same ratio of $\mu : 1$. We might then, knowing μ , the relative index of refraction of the denser medium, draw, with center P and radius $= PQ \div \mu$, an arc of a circle; the disturbance will have got to some point on that circle. Doing the same for all the P's, we have a series of circular arcs which may be connected by a line drawn so as to touch them all. This line will be a curve; and it will, for some distance from the axis, coincide very nearly with the arc of a circle whose center is at X', so that the wave front will travel in the denser medium approximately as if it had originally come from X'. The relation between the distances AX, AX', and AC is given by the formula $\mu_1/AX' - \mu_0/AX = (\mu_1 - \mu_0)/AC$, where μ_0 is the refractive index of the original, and μ_1 , that of the refracting medium. For example, let $\mu_0 = 1$ (air) and $\mu_1 = 1.5$ (crown-glass); $AC = 2$ inches; $AX = -1$ inch (*i. e.* the source of light is one inch to the left of A); then $1\frac{1}{2}/AX' + 1/1 = \frac{1}{2}/2$; whence $AX' = -2$, or the light travels in the denser medium as if it had come from a point 2 inches to the left of A. If the wave front be plane as it

Refraction

approaches A, that is equivalent to $AX = -\infty$ or $\mu_0/AX = 0$; whence AX' is equal to $+6$, or the light converges on a point in the denser medium 6 inches to the right of A. If, however, a plane wave front approach A in the denser medium, that is equivalent to $AX = +\infty$; but, as the original medium is now the denser one, $\mu_0 = \frac{3}{2}$ and $\mu_1 = 1$; whence, by the formula, $AX' = -4$, and the convergence is on a point 4 inches to the left of A. These distances of the points of convergence for plane waves, at $-4 (=f')$ from A. These plane waves, at $-4 (=f)$ and $+6 (=f')$ from A, are the principal focal distances for the curved surface and the media in question; and they bear numerically the same ratio to one another as the refractive indices do; from which, together with the previous equation, we get $-f/AX + f'/AX' = 1$; which shows, still keeping to our numerical example, that when the object lies at a greater distance than 4 inches to the left or 6 inches to the right of A, the image is a real one on the opposite side of A; whereas when it is at a less distance from A, X and X' are on the same side of A, and the image is virtual. X and X', thus

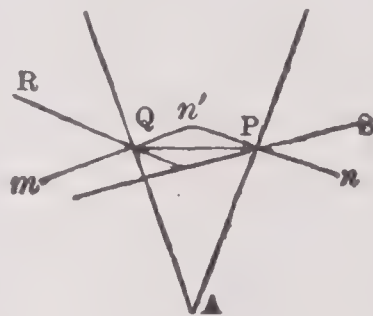


FIG. 4.

determinable when one of them is known, are "conjugate foci"; and they are interchangeable, so that an object at either will produce an image, either real or virtual, at the other.

The refracting medium may not be of indefinite extent, but may be founded in the path of the light by another surface. If this be symmetrical with respect to the first spherical surface we have a lens. If a parallel beam of light enter one plane surface and be there refracted and emerge by another which is not parallel to the first, we have the essentials of a prism. Assume the incident light to be monochromatic; then fig. 4 shows the incident beam SP taking the course SPQR. The elements of the problem are, μ being the relative index of refraction of the prism: (1) $\mu \sin PQn' = \sin SPn$; (2) $\sin PQn' = \sin RQm$; (3) angles $QPn' + PQn' = \text{angle } A$, by the geometry of the figure; and (4) angles $SPn + RQm = \text{angles } A + mn'n$, this last being the "deviation" produced by the prism. These four equations contain seven terms; and it is sufficient to measure three of these, say the angles A, SPn , and $mn'n$, in order to ascertain the rest, including μ the relative refractive index of the prism for the particular monochromatic light employed. If, however, the light em-

ployed be not monochromatic but mixed, as ordinary daylight, we find that the prism sends each wave length — each color sensation-producing component of the daylight to a different place, and thus produces a spectrum. Each wave length has its own μ and its own deviation; the more rapid, shorter waves being the more refrangible by a given piece of glass.

If in Fig. 4 the prism be turned so that S and R lie symmetrically with reference to the angle A, the deviation is then a minimum; and in that position of minimum deviation a monochromatic beam, divergent from S, will come to focus at R. In examining the spectrum of light from a source S it is necessary to turn the prism so as to insure sharpness by producing this minimum deviation for each part of the spectrum in succession. When the deviation is a minimum everything is symmetrical; $SPn = RQm$; $QPn' = PQn'$: whence, by equations above, $SPn = \frac{1}{2}(A + mn'n)$, and $QPn' = \frac{1}{2}A$; whence $\mu = \left\{ \sin \frac{1}{2}(A + mn'n) \div \sin \frac{1}{2}A \right\}$, which determines μ , when A (the angle of the prism) and $mn'n$ (the deviation) have been measured. The refractive indices of liquids and of gases are determined by enclosing them in hollow prisms of glass whose walls are made of truly parallel glass; the parallel glass produces no deviation. In liquids the angle of total reflection or "critical angle" may also be readily measured; then the sine of this angle $= 1/\mu$. The refractive index varies with changes of density, $\mu - 1$ being approximately proportional to the density; and it bears certain intimate relations with the molecular constitution of the refracting matter.

Why ether disturbances of differing wave lengths are differently refracted in such a medium as glass is not yet perfectly clear. The fact that ether disturbances of greater frequencies are propagated more slowly through optically denser matter may be fairly inferred to arise from a mutual interaction of the ether, periodically stressed and released, and the matter amid whose molecules the disturbance is propagated. The question is complicated by the downright absorption or non-transmission of many particular wave lengths, and by the peculiar behavior of some particular transparent substances which produce "anomalous dispersion"; for example, iodine vapor refracts red light more than blue, and blue more than violet; and fuchsine refracts blue and violet light less than it does red, orange, and yellow, while it absorbs the rest. Further, it is found that in these cases of anomalous dispersion the substance generally has in the solid form a surface color different from that seen through its solution; and there are always absorption

bands, on the red side of which the refrangibility is increased, while on the other side it is diminished, as if the molecules themselves took up oscillations of particular periods and hurried on the propagation of slightly slower or retarded than that of slightly more rapid oscillations of the ether. It appears as if this kind of action were never wholly absent; the spectrum produced by a prism never wholly coincides with the diffraction spectrum in which the deviation for each wave length depends directly on the wave length itself; and the spectrum produced by a prism say of crown glass does not exactly coincide in its visible distribution of colors with a spectrum of equal length made by a flint-glass prism. This is called the "irrationality of dispersion." If now we take two prisms, such as C (crown glass) and F (flint glass) in fig. 5, and pass a beam of light through; then, if the angles of these prisms be suitable, the rays dispersed by the one will be collected by the other, and there will on the whole be deviation without dispersion; but not absolutely so, on account of the irrationality of dispersion of both prisms, the effect of which is that a calculated ratio of angles



FIG. 5.

and refractive indices which will cause deviation without dispersion for any given pair of wave lengths will, to a very slight extent in most cases, fail to do so for the other wave lengths present in the mixed light transmitted through the system. By the use of three prisms three wave lengths may similarly be achromatized.

Double Refraction.—The wave surface developed when a disturbance originates at a point in a homogeneous medium, like glass, is spherical in form. In uniaxial crystals the disturbance travels with two wave fronts, one spherical, the other ellipsoidal; and the two wave fronts are coincident along the direction of the optic axis. Of such crystals some are "positive," such as quartz and ice, and in these the sphere encloses the ellipsoid; in "negative" crystals, such as Iceland spar and tourmaline, the ellipsoid encloses the sphere. If then a beam of light, plane-fronted, fall on a slice of Iceland spar, the disturbance at any point such as A (fig. 6) is transmitted from that point in two portions; one portion is refracted, as an "ordinary" refracted ray, O; the other is refracted in a way determinable by using in the construction, instead of the spheroid or arcs of a circle, the corresponding ellipsoid, or arcs of the appropriate ellipse, and it gives rise to the "extraordinary" refracted ray, E. The radius of the smaller circle is to that of the greater as $1:\mu$; the tangent to the greater

circle, at right angles to XA, cuts SS' in T; tangents TO' and TE' to the smaller circle and the ellipse are also drawn so as to pass through T; the ray XA is deflected so as to pass through the points at which these tangents touch these curves; and thus there are two refracted rays, and an eye toward OE will see two images of X. The light in the ordinary ray O is found to be polarized in a plane containing both the

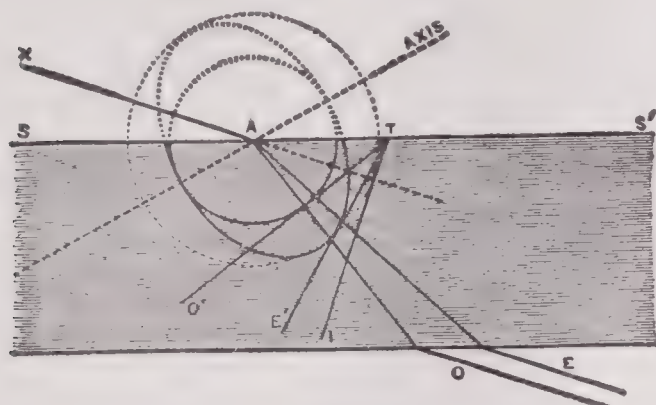


FIG. 6.

incident ray and the crystalline axis; the extraordinary ray E is polarized in a plane at right angles to this. In binaxial crystals the three optical axes are dissimilar, and the wave surfaces become complex; there are two refracted rays. If a doubly refracting substance be put between two crossed Nicol's prisms light passes; and by this means it is found that many substances ordinarily not double refracting become so when exposed to unequal stress, as by pressure, heat, or rapid cooling.

Conical Refraction.—In certain cases light, passing as a single ray through a plate of a biaxial crystallized body, emerges as a hollow cone of rays; and in others a single ray, falling on the plate, becomes a cone inside the crystal, and emerges as a hollow cylinder. These extraordinary appearances were predicted from the wave theory of light by Sir W. R. Hamilton, and experimentally realized by Lloyd. See Preston's "Theory of Light" (1890).

Refrigerant, a medicine which allays febrile disturbances by relieving the patient's thirst. Examples: Water, acetic acid, citric acid, cream of tartar in dilution, grape juice, orange juice, etc. The term is not one which has a proper scientific significance.

Refrigeration. In refrigerating machines there is a transference of heat from the substance which is to be refrigerated to the cooling agent, which is evaporating fluid, expanding gas, or a material which promotes evaporation of the liquid to be cooled. If 80.025 pound-Centigrade units of heat be withdrawn from a pound of water at 0° C. it will become a pound of ice at

the same temperature. If this heat be withdrawn from the water by an evaporating liquid there are two conditions which must be fulfilled; the evaporating liquid must evaporate very rapidly, and the latent heat of evaporation (*i. e.*, the heat absorbed from outside during evaporation) must be as great as possible. Ether boils at 35.5° C. (95.9° F.), and has at 0° C. (32° F.) a vapor-pressure of 18.4 cm. (7.36 inches) of mercury; at 0° C. it requires 94-pound-Centigrade units of heat to evaporate a pound of it; and at that temperature its evaporation ought accordingly to be able, if the whole of the heat required for evaporation were withdrawn from water, to freeze $94 \div 80.025$ times its weight of water at 0° C., so that a ton of ice (2,240 pounds) would be produced by the evaporation at 0° C. of a minimum of 1,907 pounds of ether. Alcohol is more advantageous than ether in respect of its higher specific heat, but is preponderatingly less so in respect of its lesser volatility. Liquid ammonia boils at -35° C. (-31° F.), and has at 0° C. a vapor-pressure of 318 cm. (127.2 inches), or more than four atmospheres; it is thus extremely rapidly volatilized at 0° C.; and, as its latent heat of evaporation is as much as 294, the production of a ton of ice would thus only demand the evaporation of a minimum of 610 pounds of liquid ammonia. Liquid sulphurous acid (boiling-point, -10.8° C. or 12.6° F.; vap. pr. at 10° C., 116.5 cm. or 46.6 inches, or about $1\frac{1}{2}$ atm.; latent heat of evaporation 94.56) is also a volatile liquid presenting considerable advantages. Machines for using ether have been constructed by Siebe, Siddeley, and Mackay, Duvallon, and Lloyd, Mühl and others. The ether is caused to evaporate rapidly by an air pump or pumps worked by steam; it cools brine or a solution of calcium chloride, and this cools the water to be frozen or the air to be refrigerated; the ether vapor is condensed by pressure and cold and used over again. Ammonia was first used by Carré in 1860; ammonia gas driven off by heat from its solution in water is condensed in a cooled vessel under its own pressure; the original ammonia vessel is now cooled, and the liquid ammonia rapidly evaporates (its vapor being absorbed), chilling its surroundings. Anhydrous liquid ammonia has been used by Reece and others. M. Raoul Pictet of Geneva has used sulphurous acid, the evaporation of which is hastened by an air pump. The greatest difficulties in machines of this nature are (apart from chemical action of the liquid employed) the difficulty of making joints to withstand great pressures, and the cost of condensing the evaporated refrigerant. Messrs. Tessié du Motay and A. I. Rossi have introduced a solu-

Refrigerator

tion of 300 times its volume of sulphurous acid gas in ordinary ether; the sulphurous acid and the ether are readily evaporated off together by the air pump, and on condensation the ether settles down first, absorbing the sulphurous acid; so that there are no pressures to deal with, and no sulphuric acid produced which may corrode the metal, but only ethyl-sulphuric acid, which does no great harm.

The air pump or sulphuric acid has also been employed to promote the evaporation of the liquid itself which is to be refrigerated. In Mr. A. C. Kirk's apparatus (British patent 1218 of 1862), and in the Bell Coleman apparatus, greatly employed for producing cold dry air for use in the refrigerating chambers of dead-meat-carrying steamers, the principle is that compressed and cooled air will, when allowed to expand against an external resistance, so that it does mechanical work during expansion, lose heat equivalent to the energy which it has expended. In the former the same air is alternately compressed in one place and expanded against some resistance in another.

Porous jars, used to keep water cool, are among the simplest kinds of refrigerating apparatus; the evaporation at the outer surface of the jar of the water passing through the porous earthenware taking latent heat from the water.

Refrigerator, that which refrigerates, cools, or allays heat. Specifically applied to: **Brewing**: An apparatus consisting of a shallow vat traversed by a continuous pipe, through which a stream of cold water passes. Used by brewers and distillers for cooling their worts previous to fermentation. The wort runs in one direction, and the water in another. **Steam**: (1) The casing with connecting tubes, through which feed-water passes on its way to the boiler, and is warmed by the current of hot brine passing in the other direction, on the outside of the tubes. The hot brine, at a temperature of say 218° F., is that which has been removed from the boiler by the brine pump. (2) A form of condenser, in which the injection water (fresh) is cooled by a surface application of cold sea water. A chest or closet holding a supply of ice to cool provisions and keep them from spoiling in warm weather. A chamber in which ice creams are artificially made. A refrigerant.

Refuge, that which shelters or protects from danger, distress, or calamity; that which gives shelter or protection; a stronghold; a sanctuary; a place to flee to in time of danger; a place where one is out of the way or reach of harm or danger. Specifically, an institution for affording tempo-

Regalecus

rary shelter to the destitute or homeless; a house of refuge.

Refuge, Cities of, in Jewish law and history, six Levitical cities divinely appointed as places of refuge to one who had committed manslaughter, and was pursued by the "Revenger" or "Avenger" of Blood. Three (Kedesh Naphtali, Shechem, and Hebron) were W. of the Jordan, and three (Bezer in Reuben, Ramoth Gilead in Gad, and Golan in the half-tribe of Manasseh) were E. of that river. If the case was proved to be one of murder, the perpetrator might be taken from the City of Refuge and put to death; if it was only manslaughter, the refugee had to remain in the city to which he had fled till released by the death of the high priest (Num. xxxv: 6-34; Josh. xx: 1-9).

Refuge, Harbors of, harbors or ports which afford shelter to vessels in stormy weather; places of refuge for merchant vessels from the cruisers of an enemy in time of war.

Refugee, a word that probably came into existence when the Protestants under Louis XIV. escaped from their oppressors to other lands, and a word was needed to describe the circumstances of their case. It is applied also to one who takes refuge; one who flees to a place of refuge or shelter, and to one who flies for refuge in time of persecution or political commotion to a foreign country.

Regal, an old musical instrument; a sort of portable organ, played with the fingers of the right hand, the bellows being worked with the left. It had generally only one row of pipes, and was chiefly used to support the treble voices. It was much in use in the 16th and 17th centuries.

Regaldi, Giuseppe, an Italian poet; born in Novara, Italy, in November, 1809. He heard the improvisatore Giustiniani, and resolved to rival him. He accordingly improvised in the principal cities of Italy, in France, Switzerland, and Germany, and with great success. His volumes of verse include: "War" (1832); "Poems: Extemporaneous and Elaborated" (1839); "Songs" (1840); "National Songs" (1841); "Prose and Poetry" (1861-1865); "Selected Poems" (1874); "Water" (1878). He also wrote "Dora" (1867) and "History and Literature" (1879). He died in Bologna, in February, 1883.

Regalecus, the deal-fish; a genus of acanthopterygian fishes; division Tæniiformes. Each ventral fin is reduced to a long filament, dilated at the extremity, somewhat like the blade of an oar, whence they have been called oar fishes; caudal rudimentary or absent. Range wide; they have been taken in the Mediterranean, the

Atlantic and Indian Oceans, and on the coast of New Zealand. They are sometimes called king of the herrings, from the erroneous notion that they accompany shoals of the latter fish.

Regalia, the ensigns of royalty, including more particularly the apparatus of a coronation. The regalia, strictly so called, of England consists of the crown, the scepter with the cross, the verge or rod with the dove, the so-called staff of Edward the Confessor (made in reality for Charles II.), the orbs of king and queen, the blunt sword of mercy called Curtana, the two sharp swords of justice, spiritual and temporal, the ampulla or receptacle for the coronation oil, the anointing spoon (probably the only existing relic of the old regalia), the armillæ or bracelets, the spurs of chivalry, and various royal vestments. All these, with the exception of the vestments, are now exhibited in the jewel room in the Tower of London. Their total value is estimated at \$15,000,000. The proper regalia of Scotland consist of the crown, the scepter, and the sword of state. The scepter is of the time of James V.; the sword was a present from Pope Julius II. to James IV. in 1507. They are now in the charge of the officers of state for Scotland, and are exhibited in the crown room of Edinburgh Castle. The word regalia is also used to denote royal prerogatives, or rights of a sovereign by virtue of his office.

Regardant, in heraldry, a term used of an animal having the head turned backward.

Regatta, originally a gondola race held annually with great pomp at Venice, and now applied to any important sailing or rowing race, in which a number of yachts or boats contend for prizes.

Regelation, the union, by freezing together, of two pieces of ice, with moist surfaces when placed in contact at a temperature of 32°. Regelation will take place also between moist ice and any non-conducting body, as flannel or sawdust. A snowball is formed by the regelation of the particles composing it, so are the snow bridges spanning chasms on high mountains. The fact of regelation was discovered by Faraday, and the term introduced by Sir Joseph Hooker, Huxley, and Tyndall. See ICE and GLACIER.

Regeneration, in biology, the genesis or production of new tissue to supply the place of an old texture lost or removed. In some of the inferior animals an organ or a limb can thus be supplied; in man regeneration is much more limited in its operation. Thus, when a breach of continuity takes place in a muscle, it is repaired by a new growth of connective tissue, but muscular substance like that lost is not restored. Nerve, fibrous, areolar, and epithelial tissues are more easily repaired. In Scripture, regeneration is the state of being born again,

i. e., in a spiritual manner. The word regeneration (Greek *palingenesia*) occurs twice in the Authorized Version and Revised Version of the New Testament. In Matt. xix: 28, if connected, as seems natural, with the words which follow, not with those which precede it, it refers to the renovation or restoration of all things which shall take place at the second advent of Christ. The other passage is:

"Not by works done in righteousness which we did ourselves, but according to his mercy he saved us through the washing [margin, laver] of regeneration and renewing of the Holy Ghost."—Titus iii: 5 (R. V.).

The doctrine of regeneration was formally expounded by Jesus in his interview with Nicodemus (John iii: 1-10). All theologians consider the Holy Spirit the author of regeneration. Two views exist as to the relation between baptism and the new birth. One considers the water in John iii: 5, and the washing or laver of Titus iii: 5, to be that of baptism, and that the administration of the rite of baptism is immediately followed or accompanied by what is called in consequence "baptismal regeneration." The other view is that the water, washing, and laver, in these passages, are but figurative allusions to the power of the Holy Spirit in removing the corruption of the heart, and that regeneration is effected, quite independently of baptism, by the Holy Spirit alone.

Regensburg. See RATISBON.

Regent, one invested with vicarious authority, one who governs a kingdom during the minority, absence, or disability of the sovereign. In hereditary governments the regent is usually, but not necessarily or always, the nearest relative who is capable of undertaking the office. Also a member of a governing board; a trustee; as, the Regents of the Smithsonian Institution at Washington, etc. Also a member of one of the English universities, having certain duties of instruction or government.

Regent Bird, the *Sericulus chrysocephalus*, a bower bird of beautiful plumage. In the adult male it is golden yellow and rich velvet black; the female is of more sober hue, all the upper surface being deep olive brown. The normal number of eggs is apparently two, that number of young birds having been repeatedly found.

Reggio (Reggio di Calabria), a seaport of South Italy; on the Strait of Messina; 9 miles S. E. of the city of Messina. It is the seat of an archbishop, and has a fine cathedral. Manufactures of silks, perfumes, gloves, stockings, and caps—the last three made from the byssus of the pinna (*q. v.*)—fruits, wine, and olives are cultivated, and fishing is carried on. Pop. (1901) 44,415. The ancient Rhegium was founded by Greeks in the 8th century. It was taken and destroyed by Dionysius of Syracuse (387 B.C.), the Romans (270 B.C.),

Alaric (410 A. D.), Totila (549), the Saracens (918), and captured by Robert Guiscard (1060), Pedro of Aragon (1282), and Garibaldians (1860). In 1783, and again in 1908, it was ruined by an earthquake.

Reggio (Reggio nell' Emilia), a city of Central Italy; on the ancient *Via Æmilia* (Æmilian Road); 17 miles S. E. of Parma; still surrounded with walls. It has a good cathedral of the 15th century, one of the finest theaters in Italy, a model lunatic asylum, a natural history and an antiquarian museum, a library, etc. There are manufactures of silk, hemp, turnery, leather, etc., and the inhabitants carry on considerable trade, especially in timber. Reggio is the birthplace of Ariosto. During the later Middle Ages it was an independent city, but was subject to the D'Estes from 1409 onward. The bishopric was founded in 450.

Regicides, the men who were appointed on the Parliamentary committee to try King Charles I., but in a narrower sense the men, 67 in number, who actually sat in trial on him. Of these only 59 signed the death warrant. After the Restoration the regicides were brought to trial on a charge of high treason. Twenty-nine were condemned to death, but only 10 were executed, 19, together with six others who were not tried, being imprisoned, most of them for life. More than 20 who were already dead were tried and condemned, notwithstanding, and Cromwell, Ireton, and Bradshaw, three of them, were exhumed and hanged at Tyburn, and then reburied at the foot of the scaffold. For regicides in a wider use of the term, see ASSASSINATION.

Regillus, Lake, a body of water which lay in Latium, to the S. E. of Rome, probably near the modern Frascati; it is celebrated in the semi-legendary history of Rome as the scene (496 B. C.) of a great battle between the Romans and the Latins, fighting on behalf of the banished Tarquins, in which the latter were entirely defeated.

Regina, a city of Saskatchewan, Canada, capital of the province; on the Canadian Pacific and Canada Northern railways, 332 miles W. by N. of Winnipeg, 360 miles by rail. It is the southern terminus of the Canada Northern branch from Regina to Prince Albert, and the western terminus of the Arcola branch of the Canadian Pacific. In 1907 several new branches of railway were under construction, three of which will connect the city with the Grand Trunk Pacific. The surrounding district is one of the best for wheat production in the Dominion. High-class live stock is also raised. The city is an important distributing point for the country N. and S. The leading business streets are South Railway, Scarth, Broad, Rose, Hamilton, and Eleventh avenue; the principal residential streets are

South Scarth, Cornwall, Lorne, Smith, Victoria avenue, McIntyre, and Albert.

Buildings and Institutions.—The principal buildings are the Government House and Legislative Assembly buildings, headquarters of the Northwest Mounted Police, post office and city hall, King's and Wascona hotels, Canada Permanent buildings, and several banks and other business buildings. Among the educational institutions are the normal school, a high school, 5 public schools, and the Indian Industrial School. There are an Anglican, a Roman Catholic, a Methodist, a Presbyterian, a Baptist, and a Greek church, and the Salvation Army has a barracks. There are two daily newspapers, the "Leader" and the "Standard"; the "West," a weekly, and the "Rundschau" (German).

Industry, Commerce, etc.—The leading industries are the manufacture of lumber, foundry products, beer, flour, cigars, and bricks. The city is the center of the agricultural implement trade of the province. There are 10 chartered banks. The electric lighting and water-works plants are owned and operated by the municipality. The assessed value of taxable property for 1906 was \$6,448,092. The total city assets for that year amounted to \$2,031,493, and total liabilities, \$699,110.

Regina is the headquarters of the famous Northwest Mounted Police, a picked body of 700 men, who patrol and maintain order over an immense territory in the Northwest, including Yukon Territory. In 1882 the city was a village of tents. It was proclaimed as provisional capital of Saskatchewan Sept. 4, 1905, and was afterward made permanent capital. Louis Riel, the leader of two Northwest rebellions, one in 1869 and the other in 1885, was confined in the barracks of the Mounted Police, tried, and executed in the barracks yard. Pop. (1901) 2,645; (1906) 6,169; local official est. (1907) 9,000.

Regio Felix. See CAMPANIA.

Regiomontanus, a German astronomer, whose real name was Johann Müller; born in Königsberg (in Latin Regiomontum, whence came his name), in Franconia, June 6, 1436. He was educated at Leipsic; studied mathematics at Vienna; accompanied Cardinal Bessarion to Rome, where Beza gave him further instructions in Greek literature, which enabled him to complete a new abridgment in Latin of the *Almagest* of Ptolemy. In 1471 he built an observatory at Nuremberg, but he returned to Rome on the invitation of Sixtus IV., who employed him in the reformation of the calendar. His "*Kalendarium Novum*" (New Calendar) is believed to be the first almanac issued in Europe. He died July 6, 1746.

Register, a device for automatically indicating the number of revolutions made or amount of work done by machinery; or

Registration

recording steam, air, or water pressure, or other data, by means of apparatus deriving motion from the object or objects whose force, distance, velocity, direction, elevation, or numerical amount it is desired to ascertain. There are various special appliances of this kind, each particularly adapted for the peculiar operation which is to be investigated; many depending on the action of clock-work mechanism, which indicates results on dials, but others, as in registering meteorological instruments, having means for recording varying conditions, as with the anemometer, barograph, etc. In music, the compass of a voice or instrument, or a portion of the compass of a voice; as, the upper, middle, or lower register. Also, an organ stop, or the knob or handle by means of which the performer commands any given stop. In printing, the agreement of two printed forms to be applied to the same sheet, either on the same or the respective sides thereof. The former is used in chromatic printing, where a number of colors are laid on consecutively. The latter is found in book and newspaper printing, where the correspondence of pages or columns on the respective sides is required.

Registration, a modern social or civil system pertaining to births, marriages, and deaths, variously regulated in different countries. In England, parish registers of baptisms, marriages, and burials were instituted by Lord Cromwell while he was vicar-general to Henry VIII., and subsequently regulated by various acts of Parliament. No thorough system, however, existed till in 1836 a Registration Act was passed applicable to England and Wales, which has been amended by subsequent acts. In the United States, there is no national law on the subject, such regulations being made by States, municipalities, or religious bodies. The record of deaths has always been tolerably accurate. The officiating minister, priest, or magistrate at a wedding, and the physician or midwife at a birth, are required, in all large cities at least, under penalty for failure to do so, to report to the proper office the name, age, sex, nativity, color, and social condition of the persons who marry, and the sex and color of children born, with nativity of the parents. Till within a few years records of baptisms, marriages, and deaths were chiefly kept by Church officers.

Registration of Voters. The registration of voters is required in the States of Alabama, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, North Carolina, Pennsylvania (voter not registered can vote upon proof of residence),

Regium Donum

South Carolina, Tennessee, Utah, Virginia, and Wyoming, and the Territories of Arizona and New Mexico. In Vermont a man must take freemen's oath before voting first time, no registration required. In Iowa in cities having 3,500 inhabitants. In Nebraska in cities of over 7,000 inhabitants. In Kentucky in cities and towns having a population of 3,000 or more, in Kansas in cities of the first and second class, in North Dakota in cities and villages of 1,000 inhabitants and over, in Ohio in cities having a population of 10,000 and over, in Maine in all cities and in towns having 500 or more voters. In Oklahoma Territory in cities of the first class. In Missouri it is required in cities of 100,000 inhabitants and over, and in Wisconsin in cities of 2,000 inhabitants or more and in townships of 3,000 inhabitants or more. In New York it is required in cities and villages containing upward of 5,000 population. Personal appearance not required in towns or villages of less than 5,000 inhabitants. In Rhode Island non-taxpayers are required to register yearly before December 31. In Texas in cities of 10,000 inhabitants or over. In South Dakota in cities but not in country precincts. In the State of Washington all voters in all cities and towns and all voting precincts having a voting population of 250 or more must be registered. The registration of voters is not required in the States of Indiana and Oregon. It is prohibited in Arkansas and West Virginia by constitutional provision.

Regium Donum ("royal gift"), an annual grant of public money formerly received by the Presbyterian and other Non-conformist ministers in England, Scotland, and Ireland. It began in 1672, when Charles II. gave a grant of secret service money to be distributed annually among the Presbyterian clergy in Ireland, on hearing that they had been loyal to him, and had even suffered on his account. The grant was discontinued in the latter part of the reign of that monarch, as well as in the time of James II., but was renewed in Ireland by William III. in 1690, who increased it to \$6,000 a year. It was further augmented in 1723 by George I., in consequence of the Presbyterians having supported the House of Brunswick, and raised by \$11,000 in 1784, and again by \$25,000 in 1792. The amount of the Irish grant for 1868 was \$225,000. The propriety of receiving the Regium Donum was of late years much disputed by those of the same persuasion in England and Scotland. The Irish Regium Donum was withdrawn by the Act of 1869, which came into force in 1871, disendowing the Irish Episcopal Church. Compensation was made of life interests; and the ministers were allowed to commute on the

Regnal Years

same terms as the clergy of the Church. In 1874 it was reported that the commutation money paid had amounted to \$2,898,810. The Regium Donum in England was enjoyed by the three denominations, Presbyterians, Independents, and Baptists, from 1723 till 1851. The amount required, \$8,475 per annum, was annually voted by Parliament till July 17, 1857. The Scotch Episcopalians also enjoyed for a time a small part.

Regnal Years, the years a sovereign has reigned, numbered successively, and used for chronological purposes, as in the enumeration of acts of Parliament. The practice of dating a new reign from the day following the last of the late king's reign has generally been adopted since the reign of Richard II., but before this time a reign was generally considered to begin with some act of sovereignty.

Regnard, Jean François (ren-yär), a French comic dramatist; born in Paris, in February, 1656. By common consent his rank in France is second to Molière only. His finest productions are: "The Gambler" (1696), and "The Sole Legatee" (1708). He also wrote: "The Absent-Minded" (1697); "The Unexpected Return" (1700); "The Follies of Love" (1704); "The Menæchmi" (1705), in imitation of Plautus; and a number of satires and poems. He died near Dourdan, France, Sept. 4, 1709.

Regnault, Alexandre Georges Henri, a French painter; born in Paris, Oct. 30, 1843, the son of HENRI VICTOR REGNAULT (*q. v.*). His aptitude for drawing manifested itself very early, and he was continually sketching the animals in the Jardin des Plantes. He studied art under Lamotte and Cabanel; and, after two unsuccessful attempts, gained the prix de Rome (the Rome prize) in 1866. Reaching Rome early in the following year, he executed there a remarkable portrait of Madame Duparc, and his historical subject of "Automedon Breaking the Horses of Achilles," and drew on wood illustrations for Way's "Rome." He next passed to Spain with his friend Clarin; and here, as afterward in Tangiers, he found subjects of that picturesque character which best suited his genius. In 1869 he painted an equestrian portrait of General Prim, now in the Louvre, and in 1870 "The Execution Without Judgment Under the Moorish Kings of Granada" to be found in the same collection. Other works of 1870 are "Judith" and "Salome." He returned to Paris on the outbreak of the Franco-Prussian War; and though exempt from military service, he volunteered as a private soldier, and was killed at Buzenval, Jan. 19, 1871. A monu-

Regulus

ment to Regnault, sculptured by Henri Chapu, has been erected in the École des Beaux Arts, Paris.

Regnault, Henri Victor, a French scientist; born in Aix-la-Chapelle, Prussia, July 21, 1810. A shopman in a Paris bazaar, he made such good use of his scanty leisure as to qualify himself for admission (in 1830) to the Polytechnic School, and, after the two years' course, came out as a mining engineer. He became a professor in Lyons, whence, in 1840, he was recalled to Paris as a member of the Academy of Sciences, in consequence of some important discoveries in organic chemistry. He filled chairs in the Polytechnic School and the College of France, and became in 1854 director of the imperial porcelain manufactory of Sèvres. He devoted himself to the determination of important physical data, such as the laws of expansion of gases, the measurement of temperature, latent and specific heats, and especially the numerical data bearing on the working of steam engines, for which the Royal Society of London awarded him their Rumford medal. He also received the Copley medal (1869) of the Royal Society, and was one of its foreign members. In addition to numerous papers in the "Annals of Chemistry," etc., he published an "Elementary Course in Chemistry" (1871). He died Jan. 20, 1878.

Regnier, Mathurin (ren-yā'), a French satirist; born in Chartres, France, Dec. 21, 1573. He is famed for his "Satires" (1608), 16 in number, in which he imitated Horace, Juvenal, and Martial. He also wrote a number of epistles and elegies. He died in Rouen, France, Oct. 22, 1613.

Regrating. See ENGROSSING.

Regular Clergy, the term applied in the Roman Catholic Church to priests who have taken the vows, and who are bound to follow the rules of some monastic order, as opposed to the secular clergy, that is parish priests, etc., not connected with any of the orders.

Regulus, a term in metallurgy, now used in a generic sense for metals in different stages of purity, but which still retain, to a greater or less extent, the impurities they contained in the state of ore. When, for example, the ore known as the sulphide of copper is smelted, the product of the different furnaces through which it passes is called regulus till it is nearly pure copper. The name, which signifies "little king," was first given by the alchemists to the metal antimony, on account of its power to render gold brittle.

Regulus, the star Alpha Leonis, the brightest in the constellation of the Lion. It was also called Cor Leonis, "Heart of the Lion," and the name Regulus was no

Regulus

doubt given by the Romans as expressing the qualities for which they worshiped their hero of that name.

Regulus, Marcus Attilius, a Roman general, celebrated for his patriotism and devotion in the service of his country. Made consul a second time about 256 B. C., with his colleague, Manlius Vulso, he commanded in the first war against Carthage. Taken prisoner by the Carthaginians, he was sent to Rome with an embassy, that peace might be procured on favorable terms, and bound himself, by an oath, to return if the terms were rejected. He, however, considered it his duty to advise the continuance of the war; which, being determined on, no entreaties or supplications could prevent him from fulfilling his solemn engagement; and the Carthaginians, on his return, put him to a cruel death.

Regulus, or Rule, St., according to legend, a monk of Constantinople or Bishop of Patras, who in A. D. 347, came to Muckross or Kilrimont (afterward St. Andrews), bringing relics of St. Andrew to Scotland from the East.

Regur (native name), the black clayey soil of India. It occurs principally on the table-land of the Deccan and in Nagpur. It is less frequent in Mysore, but reappears in Southern India in continuous sheets from 6 to 20 feet thick. It sometimes rests on kunkur and gravel. Though generally a surface soil, it dips beneath recent alluvium. It is extremely fertile, having produced heavy crops for many centuries without manure. Its exact age is undetermined.

Regurgitation, the flowing back into the vessels of the heart of the blood which had just left them. It is the result of valvular disease of the heart. It is of three kinds: aortal, mitral, and tricuspid regurgitation. In the first there is a diastolic murmur, best heard at the second right space and obliquely downward; in the second a systolic murmur, best heard at the left of the apex; in the third a tricuspid murmur may or may not be heard.

Rehan (originally CREHAN), **Ada**, an American actress; born in Limerick, Ireland, April 22, 1860. In 1865 she came with her parents to the United States. She first appeared on the stage in Newark, N. J., when 14 years old, but afterward returned to her studies for a year. She then appeared in Philadelphia, and later in New York. In 1879 she joined Augustin Daly's company. She frequently played before London audiences, and also in France and in Germany. Miss Rehan created over 40 rôles in comedy. Among her best known personations are Katherine, in "The Taming of the Shrew"; Rosalind, in "As You

Reichstag

Like It"; Viola, in "Twelfth Night"; Maid Marian, in "The Foresters"; Countess Vera, in "The Last Word"; etc.

Reich, Jacques, an American etcher; born in Waniskoltz, Hungary, Aug. 10, 1852; studied art in Budapest; settled in the United States in 1873, and completed his art education in New York, Philadelphia, and Paris; became skilled in pen-and-ink drawings and in the etching of portraits on copper; removed to New York in 1885. He drew the largest part of the pen portraits for Scribner's "Cyclopædia of Painters and Paintings," and also for Appleton's "Cyclopædia of American Biography." His other important work includes a series of portraits of American and English authors and other prominent persons; a half life-size plate of President Roosevelt; and a large etching of J. Pierpont Morgan.

Reichenbach, Charles, Baron von, a German scientist; born in Stuttgart, Feb. 12, 1788. He studied law and natural science at Tübingen. He formed a project of founding a German State in the South Seas, but was imprisoned by the French and gave up his scheme. He established extensive works in Moravia at which machinery, castings (statues, etc.) wood vinegar, tar, etc., were produced; published a monograph on geology; and gave his attention to animal magnetism, in connection with which he believed he had discovered a new force called Od (*q. v.*), regarding which he published various works. Among his chemical discoveries were paraffin and creosote. He died in 1869.

Reichenburg, the chief seat of the cloth manufacture in North Bohemia; on the Neisse river; 86 miles N. E. of Prague. Apart from the principal industry, in which, in the town and neighborhood, some 10,000 workmen are employed, cotton and woolen fabrics, machinery, and leather are manufactured. The cloth industry was established here in the 16th century. There is an important industrial school. Pop. (1901) 34,099.

Reichsrath, the representative council of the empire of Austria. See AUSTRIA.

Reichstadt, Napoleon François Charles Joseph, Duc de. See NAPOLEON II.

Reichstag, the representative legislative body of the German nation as a whole, as the Bundesrath is of the separate German States. The monarch has the right to dissolve the Reichstag after a vote to that effect by the Bundesrath; without consent of the Reichstag this prorogation may not last longer than 30 days, and in the case of dissolution the new election must take place in 60 days. All laws of the empire must receive the votes of an absolute majority of

the Reichstag and the Bundesrath. The president of the Reichstag is elected by the deputies. See GERMAN EMPIRE.

Reid, Charles Chester, an American lawyer; born in Clarksville, Ark., June 15, 1868; educated at the University of Arkansas and at the law school of Vanderbilt University; began practice in Morrilton, Ark. He was elected prosecuting attorney of his judicial district in 1894 and 1896; retired from that office in 1898; and was elected a Democratic representative in Congress from the 4th Arkansas district in 1901. In 1902 he was a member of the Committee on Claims.

Reid, George, a Scotch artist; born in Aberdeen, Scotland, Oct. 31, 1841. After having been trained as a lithographer, he studied art in Edinburgh, Utrecht, Paris, and The Hague. In 1891-1902 he was president of the Royal Scottish Academy; in 1891 was knighted. He is most widely known by his portraits, and as a flower and landscape painter and a book illustrator.

Reid, Mayne, a British novelist; born in North Ireland, in 1818. His love of adventure took him to Mexico and then to the United States, where he traveled extensively as hunter or trader; he joined the United States army in 1845 and fought in the Mexican War. He afterward returned to London, where he became well known as a writer of thrilling juvenile stories, many of them based on his American experiences, such as the "Rifle Rangers," "Scalp Hunters," the "War Trail," the "Headless Horseman," the "White Chief," etc. He died near London, Oct. 22, 1883.

Reid, Samuel Chester, an American naval officer; born in Norwich, Conn., Aug. 25, 1783. He commanded the American privateer "General Armstrong," and repulsed the British attack in the harbor of Fayal, Azore Islands, Sept. 26, 1814, the enemy having three vessels with 2,000 men to his single vessel with 90 men. During 10 hours' fighting, the British lost 300 killed and wounded and the Americans two killed and seven wounded. Captain Reid received many honors on his return to the United States, among others a sword from the Legislature of New York. He was made harbormaster and warden of the port of New York, invented a signal telegraph, reorganized the pilot-boat system, and established a lightship off Sandy Hook. He designed the present form of the United States flag, suggesting the retention of the original 13 stripes and the addition of a star for each new State. He died in New York city, Jan. 28, 1861.

Reid, Thomas, a Scotch philosopher; born in Strachan, Scotland, April 26, 1710. He was educated at Marischal College, Aber-

deen, and in 1737 was presented to the living of New Machar in Aberdeenshire. His first philosophical work was an "Essay on Quantity" (1748), in which he replied to Hutcheson, who had maintained that mathematical terms can be applied to measure moral qualities. In 1752 the professors of King's College, Aberdeen, elected Reid Professor of Moral Philosophy in that college; and in 1764 he published his well-known work, "An Inquiry Into the Human Mind on the Principles of Common Sense." The same year he succeeded Adam Smith as Professor of Moral Philosophy in Glasgow University, a position which he occupied till 1781. His other writings are "Essays on the Intellectual Powers of Man," and "Essays on the Active Powers of the Human Mind." His philosophy was directed against the principles and inferences of Berkeley and Hume, to which he opposed the doctrine of common sense. He was the earliest expounder of what is known as the Scotch school of philosophy, in which he was followed by Dugald Stewart and Sir William Hamilton. His doctrines were adopted also by several eminent French philosophers. He died Oct. 7, 1796.

Reid, Thomas Wemyss, an English journalist; born in Newcastle-on-Tyne, in 1842. He contributed largely to English reviews and magazines, and published: "Cabinet Portraits: Sketches of Leading Statesmen of Both Parties" (1872); "Charlotte Brontë: A Monograph" (1877); "Politicians of Today" (1879); "The Land of the Bey" (1882); "Gabrielle Stuart" (1883); "A Memoir of John Deakin Heaton" (1883); "Gladys Fane: A Story of Two Lives" (1883); "Mauleverer's Millions" (1885); "Life of William Edward Forster" (1888). He was editor of the "Speaker" from its foundation till 1899. He was knighted in 1894.

Reid, Whitelaw, an American editor; born in Xenia, O., Oct. 27, 1837. He was graduated at Miami University in 1856; was on the editorial staff of several leading Ohio papers; in 1869 became managing editor of the New York "Tribune," and, after 1872, editor-in-chief and in financial control. He twice declined appointment as minister to Germany; and was minister to France in 1889-1892, where he negotiated valuable reciprocity treaties. In 1892 he was the unsuccessful Republican candidate for Vice-President. He was special ambassador at Queen Victoria's jubilee in 1897; member of the American-Spanish Peace Commission in 1898; special ambassador of the United States at the coronation of King Edward VII. in 1902; and became ambassador to England in 1905. Among other works he published "Ohio in the War" (1868); "Schools of Journal-

Reigate

ism" (1871); "The Scholar in Politics" (1873); and "Town Hall Suggestions" (1881); "Two Speeches at the Queen's Jubilee" (1897); "Some Consequences of the Last Treaty of Paris" (1899); "Our New Duties" and "Later Aspects of Our New Duties" (1899); "A Continental Union" (1900); "Our New Interests" (1900); "Problems of Expansion" (1900).

Reigate, a thriving market town of Surrey, England; 21 miles S. of London. Of the castle of the Earls of Warrenne little remains save a grassy mound, with large vaults or caverns beneath it. The church contains the grave of Lord Howard of Effingham, and a library (1701) with some curious MSS. and many of Evelyn's books. Other buildings are the public hall (1861) and the grammar school (1675). Foxe, the martyrologist, is claimed for a resident; and Archbishop Usher died here.

Reighard, Jacob Ellsworth, an American educator; born in Laporte, Ind., July 2, 1861; was graduated at the University of Michigan in 1882, and later studied abroad; was assistant Professor of Zoölogy at the University of Michigan in 1887-1888 and in 1890-1892; directed the scientific work of the Michigan Fish Commission in 1890-1894; was placed in charge of the biological survey of the Great Lakes for the United States Fish Commission in 1898; and accepted the chair of zoölogy at the University of Michigan in 1892. He is the author of "Anatomy of the Cat" (with Dr. H. S. Jennings, 1901); and many scientific papers.

Reign of Terror, a period of the French Revolution, conspicuous for its horrors and cruelties. It is generally considered to extend from Jan. 21, 1793, the date of the execution of Louis XIV., to July 28, 1794, when Robespierre and other sanguinary leaders were guillotined on the spot where their victims had been killed. This has been termed the "Red Terror." The reaction after the restoration of the Bourbons, 1815, disgraced by acts of wanton cruelty, has been termed the "White Terror." The Jesuits were then conspicuous in the destruction of their adversaries.

Reimarus, Hermann Samuel, a German scholar; born in Hamburg, Germany, Dec. 22, 1694. He studied at Jena and Wittenberg, traveled afterward in Holland and England, became rector of the school at Wismar, and subsequently Professor of Hebrew and Mathematics at the gymnasium of Hamburg. He wrote the "Wolfenbüttel Fragments," first published by Lessing in 1777. These "Fragments," up to that time only known in MS. by a few of Reimarus's most intimate friends, produced a profound sensation throughout Germany; since in

Reindeer

them the author, in the boldest manner, denied the supernatural origin of Christianity. Another work in the same direction is his "Cardinal Truths of Natural Religion"; of a miscellaneous character are his "Life of Fabricius"; and his edition of "Dio Cassius." He died in Hamburg, March 1, 1768.

Reims. See RHEIMS.

Reina Maria Christina, The, the flagship of the Spanish fleet in the battle of Manila, May 1, 1898. See MONTJOJO, PATRICIO; MANILA BAY, BATTLE OF.

Reinbold, Adelheid. See BERTHOLD, FRANZ.

Reindeer, the *Rangifer tarandus*, the only domesticated species of the family. It extends over the boreal regions of both hemispheres, and runs into several well marked varieties. Many authors consider the American reindeer or caribou, which has never been domesticated, as a distinct species. The reindeer formerly had a much wider geographical range, and is probably the *bos cervi figura* described by Cæsar as inhabiting the Hercynian forests, probably



REINDEER.

when the European winters were much severer than now. Both the male and female have antlers, and these are not alike on both sides, the great palmated brow antler being, as a rule, developed on one side only. In the winter the fur is long, grayish brown on the body; neck, hind-quarters, and belly white. In summer the gray hair darkens into a sooty brown, and the white parts become gray. To the Laplander the reindeer is the only representative of wealth, and it serves him as a substitute for the horse, the cow, the sheep, and the goat. It is extensively employed as a beast of draught and carriage, being broken to draw sledges, or to carry men or packages on its back. A full-grown animal can draw a weight of 300 pounds, and travel at the rate of 100 miles a day, its broad deeply cleft hoofs fitting it admirably for traveling over the broken snow. In winter the herds feed in the woods on the lichens which hang

Reindeer Moss

from the trees; in summer they seek the mountains in order to escape the mosquitoes and gad-flies. In 1891 domestic reindeer were introduced into Alaska by Dr. Sheldon Jackson for the benefit of the natives who frequently suffered for food, and for purposes of transportation. In 1898 Dr. Jackson, as agent of the United States government, procured a colony of Laplanders to train the natives in the care of the reindeer.

Reindeer Moss, a lichen, the *Cenomyce rangiferina*, or *Cladonia rangiferina*, which forms the winter food of the reindeer. It has erect, elongated, roughish, very much branched podetia, the alternate branches drooping; the apothecia sub-globose, brown, on small erect branchlets. It is abundant in the pine forests of Lapland, and flourishes even when they have been burnt. Reindeer feed upon it and dig for it when it is covered by snow. It tastes like wheat bran, but leaves a slightly burning sensation on the palate. It is the badge of the clan Mackenzie. See LICHEN.

Reinecke, Carl (rī'neck-e), a German musician; born in Altona, Prussia, June 23, 1824; he was made court pianist to the King of Denmark; created Ph. D. by the Leipsic University (honorary), in 1884, and in 1850, Professor of Piano and Composition in the Leipsic Conservatory. Various compositions to the number of over 177 have made him widely known. He wrote the oratorio, "Belshazzar" and the opera "King Manfred."

Reinhart, Benjamin Franklin, an American artist; born near Waynesburg, Pa., Aug. 29, 1829; began the study of art when 15 years old and later took a course of three years at the National Academy, New York; went abroad in 1850 and studied in Paris and Düsseldorf; settled permanently in New York in 1868. His most important works include the engravings: "Cleopatra" (1865); "Washington Receiving the News of Arnold's Treason"; "After the Crucifixion" (1875); "Evangeline" and "Pocahontas" (1877); "The Pride of the Village"; and "Captain and the Governor" (1884); etc., and the portraits of the Princess of Wales, Duchess of Newcastle, Countess of Portsmouth, Lady Vane Tempest, Thomas Carlyle, Lord Tennyson, Charles O'Connor, James Buchanan, Gen. Winfield Scott, Stephen A. Douglass, etc. He died in Philadelphia, Pa., May 3, 1885.

Reinhart, Charles Stanley, an American artist; born in Pittsburg, Pa., May 16, 1844; went to Paris in 1867, where he studied at the Atelier Suisse, and to Munich in 1868, where he attended the Royal Academy. In 1870 he returned to the United States and entered the publishing house of Harper & Brothers, New York city, remain-

Reisner Work

ing there till 1876. After five years of independent art work he returned to Harpers in 1881, and in the same year went to Paris where he resided till 1888. In 1890 he again began drawing for various magazines. He exhibited in Paris, Munich, and New York city, and was a member of numerous art associations. His paintings include "September Morning"; "Coast of Normandy"; "In a Garden"; and "Washed Ashore." He died in Philadelphia, Pa., Aug. 30, 1896.

Reinick, Robert (rī'nick), a German poet; born in Dantzic, Prussia, Feb. 22, 1805. He studied painting under Schadow and Begas, and these studies influenced all of his lyric productions, which rank among the best in German literature. His works include: "Song-Book for Artists" (1833); "Song-Book of a Painter" (1837-1844); "Songs and Fables for the Young" (1844); "Hebel's Allemanic Poems Translated into High German" (1851); "Collected Songs" (1852); and "Book of Poetic Fables and Stories." He died in Dresden, Feb. 7, 1852.

Reinsch, Paul Samuel, an American educator; born in Milwaukee, Wis., in 1869; was graduated at the University of Wisconsin in 1892 and at its Law Department in 1894. After studying abroad, he was made Professor of Political Science at the University of Wisconsin in 1899. His publications include "The Common Law in the Early American Colonies" (1899); "World Politics at the End of the Nineteenth Century as Influenced by the Oriental Situation" (1900); "Colonial Government" (1901); and articles in various magazines.

Reinite, a tetragonal mineral occurring in octahedrons. Hardness, 4.0; sp. gr., 6.640; luster, dull; color, blackish-brown; streak, brown, opaque. Composition: Tungstic acid, 76.31; protoxide of iron, 23.68 = 99.99; formula as in Wolframite, FeWO_4 . Found at Kimbosan, Kei, Japan. E. S. Dana suggests that it may be a pseudomorph.

Reinsch's Test, a very delicate test for arsenic. The suspected liquid, acidulated with hydrochloric acid, is transferred to a glass vessel containing small pieces of clean copper foil, and carefully boiled. If arsenic is present, the copper becomes coated with a steel-gray film of the metal. By heating the copper foil in a dry glass tube, the arsenic is expelled and oxidizes to arsenious acid, which condenses in shining crystals on the cool part of the tube.

Reis (rā'is), a Turkish title for various persons of authority, as for instance the captain of a ship. Reis Effendi was formerly the title of the Turkish chancellor of the empire and minister of foreign affairs.

Reisner Work, a kind of inlaid cabinet work, on the principle of BUHL (*q. v.*),

Reithrodon

but differing in being composed of woods of contrasted color; named after its inventor, Reisner, a German workman in the time of Louis XIV.

Reithrodon, a genus of *Murinæ*, with three species: *Reithrodon cuniculoides*, the rabbit-like Reithrodon, from Patagonia; *R. typicus*, from La Plata; and *R. chinchilloides*, from the Straits of Magellan. The profile is arched, the eyes large, ears hairy, first and fifth toes of hind feet very short, upper incisors grooved. The first species was discovered by Darwin. Fur yellowish gray, mixed with black, throat and belly pale yellow, rump and feet white; length of head and body about seven inches, tail half as much more.

Relapsing Fever (also known as **FAMINE FEVER** and **SEVEN-DAY FEVER**), one of the three great species of continued fever, the two others being typhus and typhoid. It was first definitely discriminated from these diseases by Dr. Henderson of Edinburgh and other Scotch physicians about 1842, but it can be traced back with certainty in the records of disease a century farther, when it was prevalent in Ireland and Scotland. During the 19th century it was met with in those countries, in England, in Central and Eastern Europe, the countries surrounding the Levant, North Africa, India, China, and, though never extensively, in North America. Relapsing fever usually begins suddenly with rigors, a sense of chilliness, and frontal headache. Febrile reaction soon sets in, with a temperature of 104° or more, and pulse usually over 100 per minute; the tongue is coated with a thick moist whitish fur; and the skin is often jaundiced (a phenomenon that never occurs in typhus or typhoid fever). There is severe aching pain in the joints and muscles, and great sleeplessness; but delirium, if present at all, usually comes on only toward the end of the first week. After the above-described symptoms have lasted for a period varying from five to eight days, generally on the seventh day a sudden change takes place. This crisis commences with a copious perspiration, which is followed by a rapid falling of the pulse and temperature to or below the normal, and the patient appears nearly well. But from the fifth to the eighth day of this seeming convalescence a sudden relapse occurs, and all the primary symptoms return; these often run a rather shorter course than before, and again terminate in sweating and in a second convalescence, which is in most cases permanent. The relapse sometimes, however, occurs three or even four times. Death is a rare termination of relapsing fever; and when it does occur, it is usually before the seventh day of the disease. No important anatomical lesion is constantly observed in the bodies of those who succumb to this disease,

Relativity of Knowledge

except enlargement of the spleen. One form of the disease, however, is much more severe, and very often fatal. It was originally described as a distinct disease under the name of bilious typhoid, and is characterized by more marked implication of the digestive organs, by the constant presence of jaundice, and by absence or incomplete development of the crisis and intermission. It has now been shown to be really identical with relapsing fever proper. Relapsing fever is generally met with among those living under unfavorable hygienic conditions; it is specially apt to attack a population suffering from insufficient nourishment (hence the name famine fever), and is seldom met with among the upper classes, or among Europeans residing in the tropics, unless they are brought closely in contact with the sick. At the same time it is very infectious, spreading either directly from the patient to doctors, nurses, etc., or from clothes and bedding to washerwomen, who have suffered severely in some epidemics. It was shown by Obermeier of Berlin in 1873 that an organism (spirillum), is constantly present in the blood of those suffering from the disease, and his results have been confirmed by numerous other observers. Moreover, a similar disease has been produced in monkeys by inoculation with the organism, which has also been found in their bodies after death. There can be no doubt, therefore, that this spirillum is the cause of the disease. Though relapsing fever has been abundantly proved to be distinct from typhus, they are often associated in a curious way; epidemics of the two diseases have frequently been observed to occur in the same place either simultaneously or successively.

Treatment.—The patient, as in other febrile diseases, must be kept in bed; an emetic at the commencement of the attack is often useful, and aperients may be required; a light but liberal diet should be given. Opiates are frequently necessary to relieve the pain and sleeplessness. No means have yet been discovered for cutting short the disease or preventing relapses.

Relative Rank. See RANK.

Relativity of Knowledge, a philosophical doctrine that is almost a common-place in some philosophical schools, and is as strenuously denied by others. It is connected primarily with the contrast between the absolute and the relative, or the noumenon and phenomenon, and is one phase of the great discussion as to the relation of knowledge to reality. In its modern form the doctrine has obtained currency chiefly through the speculations of Kant, Hamilton, and Herbert Spencer. Knowledge evidently implies a knower and a relation between the knower and the object known. Hence it is argued that the object is conditioned by the

relation into which it is brought; merely by becoming an object the thing as it is in itself undergoes a change or accommodation. Our knowledge therefore can never yield us the reality of things—the noumenon or thing-in-itself—but only the phenomenon, the thing as it appears to us. Or, as it is otherwise expressed, in being known the object must conform to the nature of the knowing faculty; the mental constitution or organization of the knower; we cannot, therefore, conclude, says Hamilton, that the properties of existence are known “in their native purity and without addition or modification from our organs of sense, or our capacities of intelligence.” Hamilton’s general conclusion is: “Of things absolutely or in themselves, be they external or be they internal, we know nothing, or know them only as incognizable; and we become aware of their incomprehensible existence only as this is indirectly or accidentally revealed to us, through certain qualities related to our faculties of knowledge. All we know is therefore phenomenal, phenomenal of the unknown.” This is adopted by Spencer, and made the basis of his theory of knowledge, or rather of what Ferrier would have called his agnology, his doctrine of our necessary ignorance: “The reality existing behind all appearances is, and must ever be, unknown.” In Kant a similar doctrine is associated with the asserted subjectivity of the forms of space and time; but it is also based on the broader consideration that perception can give us “only the relation of an object to the subject, not the inward essence which belongs to the object in itself.” The empirical schools, which resolve our knowledge into impressions of sense manipulated according to the laws of association, likewise accept in its widest sense, as J. S. Mill points out, the doctrine of “the entire inaccessibility to our faculties of any other knowledge of things than that of the impressions which they produce in our mental consciousness.” But, inasmuch as they in many cases profess a skeptical idealism which denies, or leaves doubtful, the existence of any reality beyond the states of consciousness, their views are less usually associated with the term.

The starting point of the above argument must be conceded by all. Knowledge obviously implies relation; it exists only through the duality of knower and known, this duality being as necessarily present in the case of what is called self-knowledge as in the case of knowledge by self of independent objects. But the upholders of the doctrine of relativity proceed to convert this essential feature of intelligence into a proof of the “impotence” of our faculties. For the term is used in such a way as to imply a taint or defect in our knowledge. Our knowledge is condemned because it fails to realize a certain ideal. The question arises,

however, whether the ideal proposed is in any sense legitimate or possible. What is this “reality existing behind all appearances,” this thing in itself that so persistently evades our grasp? The answer of a sound philosophy would seem to be that this unknown essence or noumenal reality is a fictitious entity of our own creation. The essence or nature of a thing is expressed in its qualities or action; the noumenon reveals itself in the phenomenon. The relativists are in the habit of saying that “We know only phenomena,” thus making our knowledge of phenomena the ground of our ignorance of the corresponding noumena. But, strictly speaking, it is a misuse of language to say that we know phenomena; the phenomenon is our knowledge of the noumenon. To say that we know phenomena is therefore only a roundabout way of saying that we know, and what we know is the noumenon or thing-in-itself. Of course the contrast between knowing and being is not abolished according to this view; in human knowledge, at all events, the existence of objects is independent of our knowledge of them. It is this contrast between the thing as existent and the thing as known that lends plausibility to the doctrine of relativity. But the contrast only justifies us in saying that knowing a thing is not the same as being that thing; whereas the relativistic doctrine says that, *ipso facto*, to know a thing is not to know the reality of the thing. Knowledge, in this view, infallibly cuts us off from knowing.

The doctrine is frequently based on the large extent to which sensation enters into all our knowledge. In the structure of their sense organs different living creatures differ appreciably, and there will be a corresponding difference in the image of the world which they make to themselves. The knowledge of every being, it is argued, is thus inevitably conditioned by its organization, and there is no possibility of arriving at an objective criterion. Man, in the Protagorean formula, is the measure of all things; but he measures them only as they seem to him. Such a formula may be interpreted either in a sensationalistic and individualistic fashion, as seems to have been done by Protagoras, or in a rationalistic and humanistic fashion, as is seen in Kant. The former interpretation leads to a skeptical dissolution of knowledge, for it leaves no common ground on which individuals might meet. Kant, by making space and time, if not the categories also, forms peculiar to the human intelligence, but common to all men, provides for objective truth between man and man, but insists on the merely human and relative character of such truth. Apart from the assertion of the merely subjective character of space and time, which Kant can hardly be said to have proved, it is evident that the relativist argument applies

with most force to what are called the secondary qualities, such as tastes, smells, sounds, and colors. Things do not exist on their own account as bald brute facts, on which intelligence afterward supervenes, to make what use of them it can. It seems truer to believe that to be known and enjoyed by spiritual beings is the purpose of their existence. The relativity of the world to the human senses and intellect would then form no ground for believing that the image of the world thus obtained was in any sense distorted or untrue. We may rise to higher insight and more perfect æsthetic appreciation, but that our knowledge is finite and subject to revision does not deprive it of validity or objective truth in its own time and place. The case for the relativity of knowledge will be found strongly put in Sir W. Hamilton's "Discussions and Lectures on Metaphysics," in Dean Mansel's Bampton Lectures, and in Herbert Spencer's "First Principles."

Release, a discharge of a right; an instrument in writing, by which estates, rights, titles, entries, actions, and other things are extinguished, and discharged, and sometimes transferred, abridged, or enlarged; and, in general, a person's giving up or discharging the right or action he has, or claims to have, against another or his lands. In mechanics, the opening of the exhaust port of the steam engine, before the stroke is finished to lessen the back pressure.

Relics, personal memorials of those among the dead who have been distinguished during life by eminent qualities: especially, in the history of the Church, objects which derive their value from their connection with our Lord and with the saints; as, for example, fragments of our Lord's cross or crown of thorns, portions of the dust, the bones, the blood, the instruments of torture, the chains, etc., of the martyrs, the mortal remains, the clothes, the books, and other objects of personal use of the other saints. With them may be grouped objects to which a certain indirect sacred interest is given by their being brought into contact with the direct memorials of the distinguished dead, as by their being placed on the tombs of the martyrs, touched with the relics, or blessed at the shrine or sanctuary of the saints, etc. Reverence for relics developed with the increasing honor that was paid to martyrs.

The earliest monuments of Christian history contain evidences of the deep and reverential affection with which martyrs of the faith, their mortal remains, and everything connected with their martyrdom were regarded by their fellow Christians, and for which Roman Catholics profess to find warrant in many passages of the Old and of the New Testament, as Ex. xiii: 19; II Kings xiii: 21, and xxiii: 16-18; Matt. ix: 20-22; Acts v: 12-16, and xix: 11, 12. The

letter of the Church of Smyrna attests this plainly as to the martyrdom of Polycarp; Pontian's "Life of Cyprian" tells of their stealing the martyr's body, and carrying it away by night in holy triumph. The Apostolic Constitutions bear witness to the honors paid. Miracles, too, are described as connected with relics. Thus, Ambrose tells of a blind man's sight being restored by his touching the bodies of the martyrs Gervasius and Protasius; and similar wonders are detailed by Gregory Nazianzen, Chrysostom, and Leo the Great; so that the possession of relics of the martyrs, and even the occasional touching of them, was regarded as a special happiness. According to Theodoret, even cities were content to share with each other portions of the sacred treasure. Connected with this feeling, too, is found a belief of a certain sacred efficacy in the presence or the touch of the relics; and especially there is ascribed by Chrysostom, Basil, Theodoret, and other fathers, to pray-ers offered before the relics, a virtue in dispelling or warding off sickness, diabolical machinations, and other evils. Hence we find that altars were erected over the tombs of the martyrs, or at least that relics were invariably placed on the altars, wherever erected; insomuch that the Trullan Council ordered the demolition of all altars in which no relics had been deposited. Far more sacred than the relics of martyrs was the cross of our Lord, which was believed to have been discovered at Jerusalem by Helena, mother of the Emperor Constantine. Minute portions of the wood were distributed to the principal churches; and Cyril of Jerusalem, within less than a century after the discovery of the cross, describes the precious wood as dispersed throughout the world. According to Rohault de Fleury, "The total cubic volume of all the known relics of the True Cross is about 5,000,000 cubic millimeters, whereas a cross large enough for the execution of a man must have contained at least 180,000,000 or thereby." The practice of relic worship, and the feeling on which it was founded, were not suffered to pass without a protest. At quite an early period many abuses and superstitions had crept in, which even the fathers who admit the worship do not fail to condemn; and Vigilantius, in a treatise now lost, reprobated in the strongest terms the excesses to which it was carried, and indeed the essential principles on which the practice rests. He had so few followers, however, that were it not for the refutation by Jerome of his work against relics we should have no record of his opposition to the popular view; and it is urged by Roman Catholics, as a proof of the universal acquiescence of the Church of the 4th century in the practice of relic-worship, that it was not even found to be necessary to call a single council for the purpose of condemning Vigilantius.

The writings of Augustine, of Paulinus of Nola, of Ephraem the Syrian, of Gregory the Great, and others are full of examples of the miraculous virtue ascribed to relics, and of the variety and the extensive multiplication of sacred memorials of all kinds. Nor was this confined to the orthodox alone; all the different parties in the controversy on the Incarnation agreed with Roman Catholics and with one another on this subject, and even the Iconoclasts, at the very time that they most fiercely repudiated the use of images, admitted without difficulty the veneration of relics.

In the age of the Crusades a fresh impulse was given to the worship of relics in the West by the novelty and variety of the sacred objects brought home from the churches of Syria, Asia Minor, and Constantinople by crusaders, by palmers returning from Palestine, and by the Latin conquerors of Constantinople; and it is admitted by the most zealous Roman Catholics that at this period many false, and perhaps even absurd and ridiculous relics were introduced, and were successfully commended to the veneration of individuals or individual churches in the West; nor do they venture to doubt that abuse and superstition found their way side by side with what they regard as the genuine and authorized worship of the Church. Nevertheless, with the exception of the Waldenses, Wyclif, and a few isolated individuals, the practice remained unchallenged till the 16th century, when, in common with many other doctrines and practices of the Church of Rome, it was utterly repudiated by the Reformers. Roman Catholics, however, allege that the practice, as sanctioned by the Church, has nothing in common with the abuses which form the main ground of the objections alleged by Protestants. The Roman Catholic use of relics, as authorized by the Church, is to serve as incentives to faith and piety, by recalling vividly to men's minds the lives, and, as it were, the corporeal presence and the earthly converse of the saints, and thus placing before them, in a more touching manner, the virtues which, in the examples, are held up for men's imitation. The decree of the Council of Trent connects the subject of relic worship with the general question of saint worship, and regards the relics of the saints not as possessing intrinsic virtue, but only as instruments "through which God bestows benefits on men." The Fourth Lateran Council (1215) forbade the sale or veneration of relics till their authenticity had been approved by the authorities; the Council of Trent renewed the prohibition. In the pastoral of the Bishop of Treves, inviting pilgrims to the exhibition of the Holy Coat (1891), it is expressly stated that "the authenticity of no relic, be it the most eminent of the oldest Church of Christendom, falls under any precept of

Catholic faith." Relics are usually venerated in costly cases or "reliquaries" set on the altar; they are also carried in procession, and the faithful are blessed with them.

The Greek and other Oriental Churches, and most of the Oriental sects, agree with Roman Catholics in the practice of relic worship. On the contrary, the Reformed Churches, without exception, have rejected the usage; though non-religious relic worship is rife enough, in the form of swords of Wallace and Bruce, locks of Prince Charlie's hair, etc. The practice of relic worship forms a notable feature of the Mohammedan usage of pilgrimages, and is an even more important feature of Buddhism.

Relief, a fine or composition paid by the heir of a tenant, holding by knight's service or other tenure, to the lord on the death of the ancestor for the privilege of succeeding to the estate, which by strict feudal law had lapsed or fallen to the lord on the death of the tenant.

In physical geography, the undulations or surface elevations of a country. In painting, the appearance of projection and solidity in represented objects, so as to cause them to appear precisely as they are found in nature. In sculpture, architecture, etc., the prominence of a sculptured figure from the plane surface to which it is attached. According to the degree of prominence, it is known as alto-relievo, or high relief, mezzo-relief, or demi-relief, and bas-relief, or low relief.

Relief Church, a sect which arose in Scotland in 1752. The Rev. Thomas Gillespie, of Carnock, was deposed for contumacy on May 23, 1752. He founded the first Relief Congregation, which on Oct. 22, 1761, developed into the Relief presbytery. Ultimately it became a synod, and on May 13, 1847, joined the Secession Church in founding the United Presbyterian Church.

Relieving Tackle, in nautical language: (1) A tackle temporarily attached to the end of the tiller, to assist the helmsman in bad weather, and act as a guard in case of accident to the tiller ropes or wheel. (2) A tackle from a wharf passed beneath a vessel when careened, and secured to the opposite side, to act as a guard against upsetting and to assist in righting.

Religion, a term that since the 16th century has become naturalized in most European languages. It has even in the Teutonic tongues taken the place of the native terms formerly in use. As to its etymology, the derivation from *relinquere* is universally recognized to be inconsistent with phonetic laws; the necessity for assuming the existence of a lost transitive verb *ligere*, "to look," has not been made out; and the derivation from *relegere*, which implies carefulness and attention to what concerns the gods to be the primary signification of the word, is better than that from *religare*,

which refers the origin of religion to a sense of dependence on or connection with Deity by the bond of piety, inasmuch as the latter does not accord with the way in which the ancient Romans used the terms *religens* and *religiosus*, and supposes in them a higher conception of religion than they are likely to have possessed. The Lactantian derivation (*religare*), however, has not been shown to violate any known linguistic law; and the reason which Professor Max Müller gives ("Natural Religion," p. 35) as "the real objection" to it does not apply to it at all. It is not "the fact that in classical Latin *religare* is never used in the sense of binding or holding back." Binding or holding back, or behind, or fast, is its common meaning in classical Latin; it is its meaning in Cæsar, Cicero, Suetonius, Vergil, Horace, and Ovid. Its only other meaning is to unbind.

General terms equivalent in meaning to religion are not to be found even in such languages as Chinese, Sanskrit, Hebrew, or Arabic, and need not of course be looked for in the languages of uncultured peoples. There is no definition of religion in the Bible, nor any designation or description of it which applies to the heathen religions. The fathers and Schoolmen attempted only to give a definition of true religion. The difficulty of framing a correct definition of religion is very great. Such a definition ought to apply to nothing but religion, and to differentiate religion from everything else, as, for example, from imaginative idealization, art, morality, or philosophy. It should apply to everything which is naturally and commonly called religion; to religion as a subjective spiritual state, and to all religions, high or low, true or false, which have obtained objective historical realization. And it should neither expressly nor by implication exclude any essential element of religion, but express in a general way all that is necessarily included in its nature, indispensable to its notion. Since the need for definitions of this kind was felt — *i. e.*, since the comparative study of religions began to be cultivated — numerous attempts to supply it have been made, but few, if any, of the definitions of religion as yet proposed fulfil all the requirements. Those of Kant, Fichte, Schleiermacher, Hegel, Strauss, Wundt, Pfleiderer, Herbert Spencer, Matthew Arnold, Tylor, John Caird, and Max Müller have attracted most attention.

The classification of religions also presents great difficulties. To distribute them into (1) true and false religions, or (2) natural and revealed religions, or (3) natural and positive religions, or (4) religions of savage and of civilized peoples, or (5) book-religions and religions not possessed of sacred books, or (6) individual religions (*i. e.*, founded by great individual teachers)

and natural or race religions (*i. e.*, the collective products of peoples or races, the growth of generations), must obviously be scientifically inadequate and unsatisfactory, though some of the classifications thus obtained may not be without truth or interest. Max Müller holds that "the only scientific and truly genetic classification of religions is the same as that of languages," and Maurice Vernes that they must be classified according to races. And there can be no doubt that, if religions, languages, and races are properly classified, the classifications will, on the whole, correspond or coincide. Still they ought to be classified independently, from a study of their own proper natures, and a complete accordance of their classifications is not to be looked for. The fact, for instance, that there are universal religions, religions not limited by language or race, must not be ignored or depreciated. Hegel's classification is very ingenious and suggestive. He distributes religions into religions of nature, religions of spirituality, and the absolute or Christian religion, answering respectively both to the chief stages of the historical realization of religion, and to the childhood, youth, and manhood of humanity. The religions of nature are represented as including (1) immediate religion (sorcery and fetish-worship); (2) pantheistic religion, which comprehends the religion of measure (China), the religion of phantasy (Brahminism), and the religion of being-in-itself (Buddhism); and (3) religion which tends to freedom, and which is exemplified in the religion of the good or of light (ancient Persian), the religion of sorrow (Syrian), and the religion of mystery (Egypt). The religions of spirituality are held to be these three — the religion of sublimity (Hebrew), the religion of beauty (Greek), and the religion of the understanding (Roman). The classification of Von Hartmann is of the same character, being very ingeniously conformed to the needs of his own philosophy, and yet not conspicuously inconsistent with the facts. The classifications of Lubbock, Tylor, Spencer, Reville, and D'Alviella deserve attention as being based on an extensive and close study of religions, including those vague and rude religions to which it is especially difficult to assign appropriate places in a natural and comprehensive scheme of distribution. No general agreement, however, has been as yet reached either in determining the species of these religions or the order of their succession.

Professor Tiele classifies religions as follows: I. Nature religions, which comprehend (a) Polydæmonistic magical religions under the control of animism; (b) Purified or organized magical religions — Therianthropic polytheism, (1) unorganized and (2) organized; (c) Worship of manlike but superhuman and semi-ethical beings — An-

thropomorphic polytheism. II. Ethical religions, which are either (a) National nomistic (nomothetic) religious communities—Taoism, Confucianism, Brahminism, Jainism and Primitive Buddhism, Mazdaism, Mosaism, and Judaism; or (b) Universalistic religious communities—Islam, Buddhism, Christianity.

Religion is virtually universal, though, of course, neither the possibility nor the existence of atheism can be reasonably denied. The instances which Büchner, Lubbock, and others have adduced to prove that there are whole peoples destitute of religion will not stand the test of examination. Not one adequately attested case of the kind has yet been produced; and even if such a case were established it would go only a very little way toward proving that man is not naturally and normally a religious being.

The starting point of religious development has been variously represented as fetishism (De Brosses, Comte, Tylor), belief in ghosts (Spencer, Caspari, Le Bon), polytheism (Hume, Voltaire, Dupuis), pantheism (Tholuck, Ulrici, Caird), henotheism (Schellin, Max Müller, Von Hartmann), and monotheism (Creuzer, Professor Rawlinson, Canon Cook). All these representations are conjectural. The present state of our knowledge does not enable us to decide what the primitive religion was. Historical research does not take us back to it. Nor does it show us what stages of religion intervened between it and the earliest known historical religions. The ways in which the ruder phases of religion are represented by anthropologists and comparative theologians as having succeeded one another are merely more or less suggestive hypotheses, founded on data both insufficient and ambiguous. All serial arrangements of the kind ought to be regarded as of a merely logical, non-historical character, though they may, perhaps, aid in leading to a discovery of the historical order of development. Hence the best mode of arranging the ruder religions may be that which begins with the logically simplest phase of religion, and assigns the others a place in the order of their logical dependence and complexity. Adopting this principle, Naturism, the worship of natural objects regarded as powers or agents, will come first, implying as it does no original or special faculty or tendency, and being the direct and natural interpretation of physical facts. It may have many forms corresponding to the differences of the natural objects, and these forms may imply very different degrees of intellectual capability and very different qualities of disposition in the worshipers, though they have certainly not been shown to be successive stages of religious development. Nature worship affords a basis for all other forms of religion and worship, and in most of them its presence as a constituent is obvious. It is diffi-

cult, if not impossible, to conceive how men could have risen to any higher stage of religion except by means of it; or how they could have failed to enter it unless raised above it by a special revelation. And the notion of a special revelation to men who had not by natural means acquired any belief in or thought of deity is scarcely conceivable. Animism comes next as a natural result of the growth of the idea of soul. It is often indistinguishable or difficult to distinguish from nature worship, which is, as it were, implicit animism, while animism is explicit nature worship. When man has drawn a distinction between body and life or soul, it is natural that he should work it out in regard to himself, and then judge of other things by himself; and the phenomena of sleep and dreams, of swooning, apoplexy, ecstasy, insanity, and death, all contribute to mold his thought when once they have been turned in this direction. Hence a third phase of religion, spiritism, in which the souls worshiped are human, or conformed to the human type and conceived of according to human experience, but affected and modified by physical impressions and analogies. The hypothesis of Mr. Spencer that religion begins at this stage, the first deities being deceased ancestors, and the first worship funeral rites, takes no account of a vast mass of philological evidence which establishes that the names of the oldest known gods were descriptive of natural phenomena, and of historical evidence which shows that ancestor worship has been grafted in various localities on an older nature worship. It also rests on a very improbable assumption as to savage man's mode of viewing natural objects worshiped, and fails to explain the common features, similarities, and analogies in the various mythologies, the transformations of the ghosts into gods, the inferior position of properly ancestral gods, and especially the characteristics of nature worship. The fourth phase of religious development is Polytheism in the special sense of the term, anthropological mythology, the worship of divine individualities, generally in origin nature gods, but transformed by imagination operating under the belief that beings analogous to the human rule the course of things. The fifth phase is that in which polytheism is subordinated to, or reduced under, a Dualistic or Monistic conception of the divine. The conception may be mainly reached either by speculative or ethical thought. The sixth phase is represented by the Monotheistic religions—the Jewish, Christian, and Mohammedan. These religions all claim to rest on special revelation. In them only is belief in a plurality of gods entirely transcended. Philosophical monism in a religion does not cast out polytheism. Fetishism, image worship, totemism, shamanism, and sorcery probably should be regarded not as

distinct phases or natural logical stages of religious development, but as adjuncts and incidental perversions of religion which presuppose its normal or logical phases or stages. An adequate proof of this view would necessarily dislodge and destroy a number of current hypotheses.

The theories regarding the psychological origin and the essence of religion are numerous and divergent. It was common among the atheists of the 18th century to speak of religion as the invention of individuals desirous of deceiving their fellowmen in order to further their own selfish and ambitious views. Feuerbach, Lange, Spencer, and others account for its appearance by imagination, illusion, or the misinterpretation of ordinary or exceptional phenomena. Some zealous supernaturalists have argued that it must have originated in a primitive revelation. It may be referred exclusively to the intellectual province of human nature. This mistake, however, is too gross to have been often committed, and is sufficiently refuted by the obvious consideration that the measure of religion is not the measure of intelligence or of knowledge. Hegel did not, as is often said, fall into the error of identifying religion with thought, but only emphasized strongly the importance of thought in religion. Peschel regards the principle of causality, and Max Müller the perception of the infinite, as the roots of religion. And it may well be admitted that without both of these intellectual principles religion would be impossible. But are they more than merely conditions of its appearance? The origin of religion is, of course, referred to intellect by those who hold that God is known intuitively, perceived directly, apprehended without medium; but both psychology and history, both internal analysis and external observation, seem to disprove this hypothesis. Religion has often been resolved into feeling or sentiment. Thus Lucretius, Hobbes, and Strauss have traced it mainly to fear; the followers of Ritschl to a desire to secure life and its goods amidst the uncertainties and evils of earth; the disciples of Schleiermacher to a feeling of absolute dependence, of pure and entire passiveness; and others — *e. g.*, Brinton and Newman Smyth — to the religious feeling regarded either as a distinct primary feeling or a peculiar compound feeling. Kant represented religion as essentially a sanction for duty, and Matthew Arnold has defined it as "morality touched by emotion," "ethics heightened, enkindled, lit up by feeling." This great diversity of views of itself indicates what investigation is found to confirm — *viz.*, that religion is a vast and complex thing, an inexhaustible field for psychological study. Almost all the views referred to have some truth in them, and most of them are only false in so far as they assume themselves to be exclusively

true. The whole nature of man has been formed for religion, and is engaged and exercised in religion. Every principle of that nature which has been singled out as the root of religion has really contributed to its rise and development. The study of religion as a process of mind, and of the factors which condition and determine its development, is the special task of the psychology of religion, a department of research to which many contributions have been made since Hume initiated it in his "Natural History of Religion" (1759) by showing the importance of the distinction between the causes and the reasons of religion.

A religion is a group or whole of religious phenomena — of religious beliefs, practices, and institutions — so closely connected with one another as to be thereby differentiated from those of any other religion. Each religion has had a history and its rise and spread, formation and transformations, as a religion can only be truly traced by being historically traced. Also religions are historically connected, are related to one another, and have influenced one another, in ways which may be discovered, and can only be discovered, by historical research. Hence the history of religions is also the history of religion, not an aggregation of the histories of particular religions, but a truly general history. Like the histories of art, industry, science, and society in general, it is found on examination to have been a process of development in which each stage of religion has proceeded gradually from antecedent factors and conditions. The precise nature of the development can only be ascertained by investigation of the history itself. No hypothesis of development should be assumed as a pre-supposition of such investigation. Naturalistic apriorism is as illegitimate in historical inquiry as theological or metaphysical apriorism. The history of religion is not only of great importance in itself, but indispensable to the right understanding of general history, of the history of art, of philosophy, etc. It has been studied with more zeal and success during the 19th century than in all the preceding ages. The history of religious beliefs is, of course, only a part of the history of religions. It is, however, distinguishable, though inseparable, from it, and is often and conveniently designated Comparative Theology. It comprehends comparative mythology and the history of doctrines, myths being beliefs which are mainly the products of imagination and doctrines of reflection.

The Psychology of Religion, the History of Religions, and Comparative Theology are clearly distinct, and ought not to be confounded. At the same time they are closely connected. They agree in that they are alike occupied with religion as an empirical fact. Hence they may be regarded as parts

Religion

of a comprehensive science, to which it might be well to confine the designation "Science of Religions," instead of using it in the vague and ambiguous way which is so common. Thus understood, the Science of Religions may be said to deal with religion as a phenomena of experience, whether outwardly manifested in history or inwardly realized in consciousness; to seek to describe and explain religious experience so far as it can be described and explained without transcending the religious experience itself. Its students have only to ascertain, analyze, explain, and exhibit experienced fact. Were religion a physical fact, to study it merely as a fact would be enough. The astronomer, the naturalist, the chemist have no need to judge their facts; they have only to describe them, analyze them, and determine their relations. But it is otherwise with the students of religion, of morality, of art, of reasoning. They soon come to a point where they must become judges of the phenomena and pronounce on their truth and worth. Experience in the physical sphere is experience and nothing more; experience in the spiritual sphere is very often experience of what is irreverent and impious, immoral and vicious, ugly and erroneous, foolish or insane. Has the mind simply to describe and analyze, accept, and be content with such experience? Even the logician and the æsthetician will answer in the negative, will claim to judge their facts as conforming to or contravening the laws of truth and the ideals of art. Still more decidedly must the moralist and the student of religion so answer. Religion, then, is not completely studied when it is only studied historically. Hence it must be dealt with by other sciences or disciplines than those which are merely historical. What these are, and how they are related to religion, the writer has elsewhere endeavored to show.

All the particular theological sciences or disciplines treat of particular aspects of religion or of religion in particular ways. Their relationships to one another can only be determined by their relationship to it. They can only be unified and coördinated in a truly organic manner by their due reference to it. When religion is studied not merely in particular aspects and ways, but in its unity and entirety, with a view to its comprehension in its essence and all essential relations, it is the object of the Philosophy of Religion. Though a distinct and essential department of philosophy, and the highest and most comprehensive theological science, the philosophy of religion could only appear in an independent and appropriate form when both philosophy and theology were highly developed. It is, therefore, of comparatively recent origin,

Religious Liberty

and indeed was chiefly cultivated in Germany during the 19th century.

There are separate articles on the various religions of the world, sects Christian and other, and religious doctrines throughout this work, including those on

Agnosticism.	Parsees.
Animal-worship.	Positivism.
Animism.	Rationalism.
Anthropomorphism.	Sacrifice.
Auguries.	Secularism.
Buddhism.	Serpent-worship.
Confucius.	Spiritualism.
Idolatry.	Theism.
Inspiration.	Theology.
Materialism.	Theosophy.
Mohammedanism.	Transmigration.
Mormons.	Witchcraft.
Mythology.	Zend-Avesta.
Pantheism.	Zoroaster.

Religion, State. See STATE RELIGION.

Religious Liberty, or Liberty of Conscience, is the recognition and assertion by the state of the right of every man, in the profession of opinion and in the outward forms and requirements of religion, to do or abstain from doing whatever his individual conscience or sense of right suggests. Religious liberty is opposed to the imposition by the state of any arbitrary restrictions on forms of worship or the propagation of religious opinions, or to the enacting of any binding forms of worship or belief. The limit of religious liberty is necessarily the right of the state to maintain order, prevent excesses, and guard against encroachments on private right. In the organization of civil and ecclesiastical government which prevailed from Constantine to the Reformation, persecution was in general only limited by dissent; and universal submission to the dominant Church became the condition of religious peace throughout Christendom, while religious liberty was unknown. The contest of opinion begun at the Reformation had the effect of establishing religious liberty, as far as it at present exists, but the principle itself was so far from being understood and accepted in its purity by either party that it hardly suggested itself even to the most enlightened reasoners of that age. In Great Britain even, civil liberty, jealously maintained, was not understood, by the dominant party at least, to import religious liberty. Active measures of intolerance were adopted against dissenters in the reign of Queen Anne. Even in the reign of George III. conditions were attached to the toleration of dissenting preachers; and civil enactments against Roman Catholics have been repealed only within the 19th century. Religious liberty was introduced in Prussia by Frederick the Great, but contravened by his immediate successor. The state at present in Prussia, without, perhaps, actually dictating to private individuals, maintains a vigilant control over ecclesiastical

organization, the education of the clergy, and all public matters connected with religion. Religious liberty has been established in Austria only since 1867-1868. Italy first enjoyed the same advantage under Victor Emanuel II. The government of France, even since the Revolution, has always been of a paternal character, but practically religious liberty exists in France. In Spain, in the days of its power the most bigoted state in Europe, restricted liberty of worship was allowed in 1876. Religious persecution was actively conducted against the Roman Catholics in Russia during the reign of the Emperor Nicholas, and full religious liberty does not yet exist. Toleration has thus been slowly advancing in Europe since the Reformation, and its recent progress has been extensive; yet even in the most advanced countries the state of public opinion on this subject is still far from being satisfactory. In the United States religious liberty has always been recognized.

Religious Liberty, History of. The history of religious liberty is a long and glorious record of human striving after a precious and God-given right. The heroes of this noblest freedom do not all belong to the 19th century. Socrates died a martyr to intellectual liberty; Jesus Christ taught principles which involve the sacred rights of conscience; Paul exercised a glorious liberty in preaching the doctrines which liberate the soul. In the first three Christian centuries the Church, speaking through Justin Martyr, Tertullian, and Lactantius, proclaimed the right of every man to worship according to his convictions. Constantine put forth the Toleration Edict. After the long night of mediæval intolerance came the dawn of religious liberty, which, however, did not reach high noon at once. Erasmus fought priestly intolerance; Giordano Bruno was a martyr to the rights of conscience; the founders of the Dutch republic achieved both liberty and toleration. Jeremy Taylor, Milton, Locke, Roger Williams are names not to be omitted from the great story. Cromwell befriended the persecuted Jews. The Mohammedan Akbar was a grand exception to Moslem intolerance. Lessing, in his "Nathan the Wise"; Voltaire in his fiercer way, wrought much for the spirit and practice of toleration. Jefferson and Madison are great names in the history which records how the United States established itself on the rock of religious freedom. Napoleon became, in a way, the emancipator of the Jews.

But if we contrast present conditions with those prevailing in most civilized lands at the beginning of the 19th century, we shall see that one of the marked features of the last 100 years has been the wondrous growth of the idea of liberty of conscience. In arguing with those who op-

pose toleration, Professor Bonet-Maury of the Protestant faculty, University of Paris, in his just published and very important "History of Liberty of Conscience in France from the Edict of Nantes to July, 1870," rightly says: "They forget that men's beliefs are the fruit of liberty, and that the disposition to impose on men by force any sort of faith is to attack the divinity of conscience and to outrage the majesty of the Divine Image which is within us." He has very clearly exposed the errors of those who fight the rights of conscience. Their first error is psychological; the notion that philosophical or religious beliefs depend directly and exclusively on the will; and secondly, the theological error; the notion that diversity of religion is a fault or a transgression of the Divine Will.

Most thinking men have come to realize that toleration is a word representing an imperfect spirit in regard to the rights of the human mind. Governments which may tolerate would seem to reserve the right to persecute. "The most despotic governments are tolerant toward subjects who are too numerous or too useful to be killed or exiled." But toleration is a stepping stone to liberty. No sensible man acquainted with the facts can fail to realize that the wide growth of toleration is one of the most important facts of the century. Wherever we look, whether to Russia or to Italy, to Germany or South Africa, to Great Britain or China, to France or Austria, we behold the area of toleration, and, hence, of religious liberty widening. In the German empire the progress of toleration has been conspicuous, so that, according to Dr. Schaff, the great Teutonic realm "is committed to the principles of religious liberty and equally as much as the United States, and can as little interfere with the religious convictions and the exercise of public worship, or deny to any citizen his civil or political rights on account of his religious opinions."

By the treaty of Westphalia in 1648 religious equality was granted to the Catholic and Protestant Churches, but though this limited toleration was not approved by the papacy, and though the papal syllabus of 1864 condemns religious toleration among the 80 heresies of the age, the Catholic Church has widened in Germany the realm of its independence. In the long struggle between Bismarck and the Pope, the papacy triumphed and deserved to triumph. If we must qualify Dr. Schaff's contention that Germany is as free religiously as our own country, it would be by recalling the fact that the Jesuits were driven out of German territory in 1872. The claim is made, however, that this was the act of self-defense against political agitators.

In Austria the history of religious progress, beginning in 1848, culminates with the

law of 1868, which granted full liberty of religion, but a liberty limited to the churches recognized by the government. Whether that freedom is enjoyed or not depends largely on the sentiment of local authorities. Toleration and freedom have still other victories yet to be won in Austria. In Italy the Waldenses were emancipated in that year, 1848, which marks a new era of religious progress throughout Europe. The constitutions granted at that memorable epoch guaranteed the free exercise of divine worship. Since 1870 the Free Italian Churches and many others have sprung into life, and a new heaven is working for the emancipation of the Italian mind. In Spain religious liberty dates its feeble beginnings from 1869. Concessions are neutralized by certain restrictions, for the constitution of 1876 limits the liberty of those who are not Catholics to worship in private houses.

Switzerland comes nearest to America in religious freedom. In France the Catholic, Protestant, and Jewish Churches have been placed on a level before the law. The right of assembly and teaching is legally unquestioned, and Protestant missionaries are able to go everywhere in France and carry on their zealous propagandism. But the spirit of persecution is not dead in France, as is shown by the recent fierce agitation against the Jews, and a very large number of earnest clericalists are opposed to the free spirit of the third republic. The alphabet of toleration is yet to be learned by some of the leading ecclesiastics of France, who regarded with fierce disfavor the proposition to hold a second Congress of Religions in Paris. It was their antagonism which prevented its accomplishment. And yet Professor Bonet-Maury sums up his history with the statements: "Since the Edict of Tolerance of Louis XVI., in spite of some offensive returns of the gloomy idea of religion in the State, the spirit of tolerance, or better, of respect for liberty of conscience, has grown." "Violent procedures by civil powers against individuals or societies on account of their philosophical or religious beliefs have become more and more rare."

In Holland and Scandinavia, even with Church establishments, perfect religious equality is enjoyed. And by the treaty of Berlin, 1878, the sultan's government was forced to this position, that in no part of the Ottoman empire shall difference of religion be alleged against any person as a ground for exclusion or incapacity as regards the discharge of civil and political rights, admission to the public employments, functions and honors, or the exercise of the various professions and industries. The outrageous persecutions which have fallen on the Armenians in contravention of this treaty, and which the

powers of Europe failed to prevent and punish, are among the burning shames of a century which won many victories for the right of rights.

The British empire (I am now speaking of what lies beyond the British islands) is the widest domain of toleration on which the sun shines. That empire has been called the "hugest outstanding Parliament of Religions now existing in the world." In Australia, New Zealand, South Africa, the Dominion of Canada, and throughout the broad and populous peninsula of India, full liberty of conscience and all the rights of spiritual freedom are enjoyed. When we look at England itself we are compelled to remember that her great act of religious freedom is the Act of Toleration of 1689, and that this was not an edict of liberty. Englishmen at that time did not believe in religious freedom. But inevitably that Act of Toleration led to a large enjoyment of the rights of conscience, and during our century its benefits have been extended to Unitarians, Catholics, and Jews. The disestablishment of the Church of England in Ireland was a great step in the right direction, and with the surely coming disestablishment of the Church in Scotland, Wales, and England, the area of liberty will be enlarged. It may be that practically there is as much spiritual freedom in Great Britain as in America, but the non-Conformists are discontented "with their status of legal and social inferiority," and, furthermore, the subjection of the Established Church to the State appears to many a transgression of the law of liberty established by Christ himself.

The area of toleration has been enlarged by the official action of China in granting to the different European nations the right of sending Christian missionaries, not only to the port cities, but to the interior of that vast empire. The Chinese government has given repeated assurance of its belief that the doctrines of Christianity and the practice of them were for good. The recent fanatical uprising of those who hate all foreign influences will not permanently diminish the area of religious liberty in the far East. No sensible man believes that the Christian nations will permit any abrogation of rights guaranteed by international treaty.

In Mexico religious tolerance is a part of the new life of that prosperous republic; and even in priest ridden South America the rights of non-Catholic citizens have received new guarantees or have been acknowledged for the first time, in Ecuador, Bolivia, Peru, and elsewhere.

America is the great home not so much of toleration as of true liberty. In the United States the government has no authority to interfere with religion. The fullest liberty is possible only where the

Church and State are separate. From the beginning of our organized national life this separation has prevailed and been the fundamental law and practice of our country. Here the Jews have had freedom and have been treated with a friendliness never elsewhere shown to them. America is the standing reply to those who believe that religion needs the support and guidance of the State. Christian progress in our country has been more rapid than the progress of the population, and it is as true today as when De Tocqueville wrote that "there is no country in the whole world in which the Christian religion retains a greater influence over the souls of men than in America."

When complete religious liberty exists, toleration becomes not a legal, but a mental and moral condition. It is a state of mind, and the most remarkable advance has been in the kindlier feelings between men of various faiths and various divisions of the same faith. James Lane Allen, in his "Reign of Law," recalls the time in the last century when Christians used to throw live snakes into the assemblies of other Christians of whom they disapproved. Snake-throwing has disappeared. Occasional acts of intolerance occur, but are opposed to the almost universal sentiment of the country. Bigotry, or the worship of one's own opinions, is giving way to charity. Pulpits are exchanged today by representatives of various denominations. Eighty years ago such interchange was scarcely known. The Unitarians have accomplished a large work for the spirit of true tolerance. Men who are pronounced in their Church preferences are pleading with more and more earnestness for the coöperation of denominations. Church comity is coming to be a fact. Men are seeing that Presbyterianism, for example, is much smaller than Christianity; that Congregationalism is not the Holy Catholic Church. With Christian large mindedness we are learning to love the virtues and achievements of other denominations. The rise of the Young Men's Christian Association, the mighty evangelistic work of President Finney and Mr. Moody, the marvelous growth of the Christian Endeavor societies, all have had a powerful influence in promoting fellowship, and hence in breaking down the spirit of intolerance.

The next step of progress will resemble the political change which came over our country when the colonies having common interests became federated. Federation precedes either unification or wide and generous coöperation in many things.

Those who have contributed to the world's progress in religious liberty during the century now closing are a noble army, working in various ways and in different lands. He who writes the story of the century in this realm of progress must tell of James Madi-

son, the chief advocate of the first amendment to the Constitution, declaring that "Congress shall make no law respecting any establishment of religion, or prohibiting the free exercise thereof." He must tell you of the work of Channing, Theodore Parker, Emerson, Lyman Beecher, Bushnell, Henry Ward Beecher, Phillips Brooks, Charles A. Briggs, Francis E. Clarke, and John Heyl Vincent. The historian will not forget Max Müller and his great work for comparative religion and the humanizing of the churches in their attitude toward non-Christian faiths. He will tell of what Gladstone, Macaulay, Tennyson, and Dean Stanley wrought in England for the enlargement of mental freedom. Coming to France, he will speak of Mme. de Stael, Guizot, Athanase Coquerel, and Jules Simon. He will not forget John Frederick Oberlin, the model pastor, the friend of Catholics and Jews, and the champion of love as greater than zeal. He will not forget the Persian sage, the Moslem reformer Beha Allah, who taught his people that all nations are one and all men are brethren and that the bonds of unity should be strengthened between those of various faiths.

Probably in no other country than America could such a Congress of Religions have been held as that which was the crowning feature of the Columbian Fair. By that remarkable gathering the bonds of brotherhood and of true toleration were enlarged. Catholics and Protestants for the first time in a great assembly sat together for 17 days in the spirit of fraternity and kindliness. The representatives of the great non-Christian faiths were treated with perfect courtesy, and illustrated the spirit of courtesy themselves. Many Christians learned a new lesson, following the teachings of Sir Monier Williams, not to shut their eyes to any truth or virtue which may be found in the non-Christian characters and non-Christian writings. Mr. Mozoomdar has recently written with great appreciation that the attitude of Christian missionaries toward Hindu prophets and Hindu faith shows less and less of the old-time polemic intolerance. It may take generations before the other peoples reach the height which America reached in 1893, but no one doubts that such a height, which now looks lonely, will yet become a table-land on which the nations of the earth shall assemble.

JOHN H. BARROWS.

Rembrandt van Ryn, Paul Harmens, a celebrated painter and engraver of the Dutch school; born in Leyden, Holland, July 15, 1606. He acquired his art from several masters at Amsterdam, and early in life grew famous, his studio being crowded with pupils, and his works selling rapidly. Rembrandt was master of all that relates to coloring, distribution of light and shade,

Remenyi

and composition, and though deficient in other requisites of a true artist, it cannot be denied that his pencil is masterly and unique, possessing an energy and effect belonging to no other painter. His etchings have wonderful freedom, facility, and boldness. Rembrandt was twice married, resided during the greater part of his life at Amsterdam, and acquired a large fortune. Among his well-known works are: "The Anatomical Lecture" (1632); "Descent from the Cross" (1633); "St. Thomas" (1634); "Tobias and the Angel" (1638); "Portrait of his Mother" (1639); "The Gilder" (1640); "The Night Watch" (1642) considered his masterpiece; "Christ Healing the Sick" (1651); "Burgomaster and Wife" (1657); "The Synodics" (1661); and "The Betrothed Jewess" (1669). He died in Amsterdam and was buried Oct. 8, 1669.

Remenyi, Edouard, an Hungarian violinist; born in Heves, Hungary, in 1830; received a musical education at the Vienna Conservatory. In 1851, after the Hungarian revolution, he was forced to flee to the United States, but returned to Europe in 1853. In 1854 he visited London, where he was appointed solo violinist to Queen Victoria. In 1860 he obtained his amnesty and returned to Hungary, where he attained to great distinction. In 1865 he went to Paris, achieving there a tremendous success. Thenceforth he made repeated concert tours on the Continent and in England. In 1878 he returned to the United States, where he spent much of his time and gave many concerts, though during these years he also made visits to other countries. He died in San Francisco, Cal., May 15, 1898.

Remey, George Collier, an American naval officer; born in Burlington, Ia., Aug. 10, 1841; was graduated at the United States Naval Academy in 1859; served with distinction during the Civil War, and was captured during the assault on Fort Sumter, in 1863. When the war with Spain broke out he was placed in command of the naval base at Key West, Fla. He was promoted rear-admiral in 1898, and in 1900 was given command of the Asiatic Station at Yokohama, and in this capacity directed the operations of the United States naval forces in China.

Remington, Philo, an American inventor; born in Litchfield, N. Y., Oct. 31, 1816. He entered the small arms factory of his father, and for 25 years superintended the mechanical department. The perfecting of the Remington breech loading rifles and of the Remington typewriter was largely due to his inventive skill. In 1886 he withdrew into private life.

Remington, Frederick, an American artist and author; born in Canton, N. Y.,

Remittent Fever

Oct. 4, 1861; was educated at the Yale Art School, and at the Art Students' League, New York. In early life he became a cowboy and stockman on a ranch in Montana, where he gained that knowledge which later was to prove the secret of his unusual success in depicting frontier life. Subsequently he became an illustrator for magazines, treating of military and Western subjects and during 1897-1898, of Cuban scenes. The strength of his work lies in the life and motion with which he imbues his subjects. Among his best-known productions are, "An Impression from the Pony War Dance"; "The Last Lull in the Fight"; "The Last Stand"; "The Advancer, or, The Military Sacrifice"; "The Arrival of the Courier"; "A Buck Jumper," etc. He has also written several books and clever short stories, of which "Pony Tracks"; "Crooked Trails"; "Frontier Sketches"; and "The Sundown Leflare"; are best known. In sculpture, Mr. Remington produced "The Broncho Buster"; "The Wounded Bunkie"; etc. He was a conspicuous artist in "black and white." He died Dec. 26, 1909.

Remington, Joseph Price, an American pharmacist; born in Philadelphia, Pa., March 26, 1847; was graduated at the Philadelphia College of Pharmacy in 1866; and became Professor in the Pharmaceutical Laboratory and dean of the Philadelphia College of Pharmacy in 1893. He was a member of many American and foreign pharmaceutical and medical bodies, and author of "Remington's Practice of Pharmacy" (1886); joint editor of "United States Dispensatory" (1883); etc.

Remington Rifle. See FIREARMS: RIFLES.

Remittent Fever, one of the varieties of fever arising from malaria or marsh poison—one being intermittent fever, or ague. In its milder forms it scarcely differs from severe intermittent fever; while in its more serious form it may approximate closely to yellow fever. The attack may be either sudden or preceded by languor, chilliness, and a general feeling of illness. Then comes a cold stage, usually of short duration. This is followed by a hot stage, in which the symptoms are commonly far more intense than those exhibited in the worst forms of ague. Giddiness proceeding to delirium is not uncommon, and is a bad symptom; while in other cases drowsiness or lethargy is one of the most marked symptoms. There is often great tenderness or pain in the region of the stomach, and vomiting—the vomited matter frequently containing bile or blood. A remission of these symptoms occurs, in mild cases, in six or seven hours; but in severe cases the paroxysm may continue for 24 hours or longer. The remission is

sometimes, but not always, accompanied with sweating. The duration of the remission is as varied as that of the paroxysm, varying from 2 or 3 to 30 hours, or even longer. The fever then returns with increased severity, and without any cold stage; and then the paroxysms and remissions proceed, most commonly according to no recognizable law, till the case terminates either fatally or in convalescence. In favorable cases convalescence is usually established in about a week. The severer forms of this fever are often accompanied with more or less jaundice, and hence the disease has received the name of bilious remittent fever. It is also known as jungle fever, lake fever (from its prevalence on the border of the great American lakes); and the African, Bengal, Levant, Walcheren, and other similar local fevers are merely synonyms of this disease. In England the disease is very rare; and when it occurs it is usually mild. The disease is most severe in Southern Asia, Western Africa, Central America, and the West India Islands.

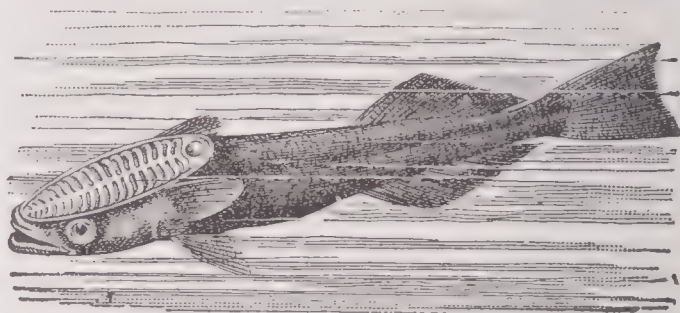
The first object of treatment is to reduce the circulation during the hot stage. This is done by a dose of five grains each of calomel and James's powder, and, after an interval of three or four hours, by a sharp cathartic—as, for instance, the ordinary black draught. On the morning of the following day the remission will probably be more complete, when quinine should be freely and repeatedly administered. A mixture of antimonial wine with acetate of potash should also be given every two or three hours, so as to increase the action of the skin and kidneys. The patient must be carefully watched during the period of convalescence. A timely removal from all malarious influence, by a change of climate or a sea voyage, is of the highest importance.

Remonstrance, The Grand, in English history, a remonstrance consisting of 206 articles, condemning the arbitrary procedure of Charles I. It was carried in the House of Commons, Nov. 22, 1641, by a majority of 11, and presented to the king on Dec. 1.

Remonstrants, a name given to the Dutch Protestants, who, after the death of Arminius (A. D. 1609) continued to maintain his views, and in 1610, presented to the States of Holland, at Friesland, a remonstrance in five articles formulating their points of departure from Calvinism. Their adversaries presented a counter remonstrance, whence they were called Counter Remonstrants. In 1619 the Synod of Dort pronounced in favor of the stricter school. The Remonstrants still form a small but liberal and scholarly sect in Holland.

Remontoir Escapement, in clock making, an escapement in which the scape-wheel is driven by a small weight raised by the clock, usually at intervals of 30 seconds; or by a spiral spring on the scape-wheel arbor, wound up a quarter or half turn at the said intervals.

Remora, the sucking-fish, or sucker; a popular name for any species of the genus *Echeneis*; specifically, *E. remora*, about eight inches long, common in the Mediterranean. By means of the suctorial disk, a transformation of the spinous dorsal fin, the species can attach themselves to any flat surface. The adhesion is so strong that the fish can be dislodged only with difficulty, unless pushed forward with a sliding motion. Being bad swimmers, they attach themselves to vessels, or to animals having greater power of locomotion than themselves; but they cannot be regarded as parasites, as they do not obtain their food



REMORA OR SUCKER.

at the expense of their host. It has been believed that the remora is able to arrest vessels in their course; this is fabulous, though the attachment of one of the larger species may retard the progress of sailing, especially when, as is sometimes the case, several individuals accompany the same ship.

Remsen, Ira, an American chemist; born in New York city, Feb. 10, 1846; was graduated at the College of the City of New York in 1865, and later at the College of Physicians and Surgeons, and at the University of Gottingen; was Professor of Chemistry at Williams College in 1872-1876; founded the "American Chemical Journal" in 1879. He was a member of many scientific organizations and societies; and the author of numerous textbooks including "The Principles of Theoretical Chemistry"; "Inorganic Chemistry"; "Chemical Experiments"; etc.; became Professor of Chemistry at Johns Hopkins University in 1876, and succeeded Dr. Daniel Coit Gilman as president there in 1901.

Remus, the twin brother of Romulus, who was the fabled founder of Rome. According to the old myth, Romulus killed his brother.

Rémusat, François Marie Charles, Comte de, a French author; born in Paris,

March 14, 1797, the son of Augustin Laurent, Comte de Rémusat (1762–1823). Rémusat early developed Liberal ideas, and took eagerly to journalism. He signed the journalists' famous protest against the Ordinances of Polignac, which brought about the "July revolution," and was elected deputy for Toulouse; allied himself with the Doctrinaire party, and in 1836 became under-secretary of state for the interior; in 1840 was made minister of the interior, but soon resigned the office; he was exiled after the coup d'état of Louis Napoleon, and devoted himself to literary and philosophical studies. In 1871, he held the portfolio of Foreign Affairs, which he retained till 1873. Rémusat was long a well-known contributor to the "Revue des Deux Mondes" (Review of Two Worlds). He died June 6, 1875.

Rémusat, Claire Elisabeth Jeanne de, a French essayist; born in Paris, France, in 1780. She was the mother of Charles de Rémusat, and companion to the Empress Josephine. She wrote an "Essay on the Education of Women" (1824). Her "Memoirs" are very celebrated. They form the substance of her diary, destroyed by fire and rewritten by her from memory. They are very unfriendly to Napoleon. She died in 1821.

Rémusat, Jean Pierre Abel (rā-mü-sä), a French Orientalist; born in Paris, Sept. 5, 1788. He studied medicine, and took his diploma in 1813; but as early as 1811 he had published an essay on Chinese literature. In 1814 he was made Professor of Chinese in the College of France. Of the numerous works that he wrote subsequent to this period we may mention "Researches in the Tartar Dialects" (1820). His most important work was "Elements of Chinese Grammar" (1822). He wrote also on the origin of Chinese writing (1827), on Chinese medicine, on the topography and history of the Chinese empire, and "Asiatic Miscellanies" (1843). Rémusat was the first to make known in Europe, the life and opinions of Lao-Tsze. In 1818 he became one of the editors of the "Journal des Savants"; in 1822 he founded the Asiatic Society of Paris; and in 1824 he was appointed curator of the Oriental Department in the Royal Library. He died in Paris June 3, 1832.

Renaissance, a name given to the great intellectual movement which marks the transition from the Middle Ages to the modern world. It was a change in attitude of mind and ideal of life, in philosophy, art, literary criticism, political and religious thought. Substantially a revolt against the dogmatism of the Middle Ages, the new spirit claimed the entire liberation of reason, and passionately recognizing and

studying the rich humanity of Greece and Rome, aimed at a complete rehabilitation of the human spirit with all the free activities and arts and graces which invested the classical age. Zeal for the Litteræ Humaniores brought forth a new ideal of culture, and the new view of life for which the name of HUMANISM (*q. v.*) is used. Renaissance, rebirth, was originally used as synonymous with the Revival of Letters, the revived study in a new spirit of the classical languages and classical literatures of Greece and Rome in all their depth and breadth, interpreted in their own spirit, and divested of the narrow traditional limitations. Greek in especial was practically a new discovery; but the knowledge of the classics was only one side of the movement. The new spirit powerfully aided in weakening the power of the papacy, in the establishment of Protestantism and the right of free inquiry. Under its impulse astronomy was eventually reformed by Copernicus and Galileo, and science started on its modern unfettered career; by it, too, feudalism, which had been weakened by the communal movements of the Middle Ages, was abolished, and the demand for political liberty was advanced. National languages began to flourish. To the same general impulse belonged also the invention of printing and multiplication of books, new methods of paper making, the use of the mariner's compass, the discovery of America, and the exploration of the Indian Sea. The fall of the Eastern empire in 1453 sent Greek scholars to promote the revival of scholarship already in progress in Western Europe. No definite date can be given for the beginning of the Renaissance. Long before the close of the Dark Ages there were isolated scholars and thinkers who anticipated the new light. In its main elements the movement originated in Italy toward the end of the 14th century, and, attaining its full development there in the earlier half of the 16th the Renaissance communicated itself throughout the whole of the rest of Europe; France, Germany, England, and other countries participating later in the movement, which in each of them took a somewhat different shape.

Some of the faults of the Renaissance clung to it in all its periods. At one time pedantry threatened to check originality and spontaneity; the worst ancient works were prized more than the best written in any new European tongue. Petrarch valued himself mainly for his Latin works, and thought lightly of his Italian poems. The tendency was established to regard the classics as the one standard of learning and the one instrument of education. A worse fault was the revolt against mediæval religious tradition accompanied to a very large extent by absolute and anti-Christian immorality and license. In Michael Ange-

Renan

lo, Raphael, Picodella Mirandola, Ficino, and others, in whom Humanism did not extinguish the principles of Christianity and morals, a singularly noble and complete humanity was displayed. The culmination of the Renaissance in Italy may be regarded as having fallen within the half century 1456-1500; and its close for the land of its birth may be fixed at the sack of Rome in 1527 by the Constable de Bourbon, followed by the transference of Humanism in its later developments to France, England, and the rest of Europe.

In Germany the change was as marked as in Italy, but the Humanism of Germany and the Low Countries was very different in spirit from that of Italy. Not less tinged by a revived love for ancient learning, it was never divorced from morality nor hostile to Christianity; and its most important direct outcome was the Reformation. Biblical and Oriental studies were strenuously cultivated. Among the noted leaders were Erasmus, Melancthon, Reuchlin, and Von Hutten. In the Netherlands and Flanders the new school of painting was a notable development. In France the movement had rich results in art and letters. Villon, Marot, Ronsard, but above all Rabelais are types of the French Renaissance in pure literature; while within the sphere of scholarship and religious reform are Scaligers, Dolet, Muretus, Cujacius, Salmasius, Casaubon, Beza, Calvin.

In England Wyclif and Chaucer may be regarded as the forerunners of the Reformation and the Renaissance; but the main streams of both these movements reached England contemporaneously. In scholarship the great names are Grocyn, Linacre, Colet, Ascham, and More; but the fullest English outcome of the Renaissance was the glorious Elizabethan literature, with Spenser and Shakespeare, and in philosophy Bacon, as its most noted representatives. C. H. MOORE.

Renan, Joseph Ernest (rē-nang), a French writer; born in Tréguier, France, Feb. 27, 1823. He studied at the seminary of St. Sulpice, Paris, but in 1845 gave up all intention of becoming a priest, and devoted himself to historical and linguistic studies, especially the study of Oriental languages. In 1848 he obtained the Volney prize for an essay on the Semitic languages. In 1849 he was sent by the Academy of Inscriptions and Belles Lettres on a mission to Italy, and in 1860 on a mission to Syria. In 1862 he was appointed Professor of Hebrew, Chaldee, and Syriac in the Collège de France, but the skeptical views manifested in his "Life of Jesus" (1863), raised an outcry against him, and he was removed from his chair, to be restored again, however, in 1871. This work, the publication of which caused intense excitement throughout Europe, was the first part of a

Renegade

comprehensive work on the "History of the Origins of Christianity," which includes "The Apostles" (1866); "St. Paul" (1867); "The Antichrist" (1873); "The Gospels" (1877); "The Christian Church" (1879), and "Marcus Aurelius" (1880), all written from the standpoint of one who disbelieves in the supernatural claims of Christianity. Renan's latest important work is the "History of the People of Israel till the Time of King David." Other works are "General History and Comparative System of Semitic Languages," "Studies in Religious History," "Discourses and Lectures," several philosophical dramas, and his personal reminiscences called "Recollections of Childhood and Youth." He became a member of the French Academy in 1878. He died Oct. 2, 1892.

Rendsburg, a town of Schleswig-Holstein, Prussia, on the North Sea and Baltic Canal, 19 miles W. of Kiel. Pop. 12,154. Rendsburg was taken by the Imperialists in 1627; by the Swedes in 1643; and by the Prussians and confederate troops in 1848. The first diet of Schleswig and Holstein met there April 3, 1848. It was reoccupied by the Danes in 1852, and taken by the Prussians after a serious conflict July 21, 1864.

René, surnamed THE GOOD, Duke of Anjou, Count of Provence, and King of Sicily; born in Angers, France, Jan. 16, 1409; son of Louis II., Count of Anjou. He married in 1420 Isabella of Lorraine, but was driven from that duchy and kept prisoner by the Duke of Burgundy for several years. He succeeded his brother, Louis III., in 1434, and was chosen successor to the kingdom of Naples by Queen Joanna II.; was liberated in 1436, and was afterward engaged in war for three years with Alfonso of Aragon. Being unsuccessful in this conquest, René retired to Provence and devoted himself to the administration of his estates, and to the cultivation of poetry and the fine arts. His daughter Margaret was married, in 1445, to Henry VI. of England. On the seizure of Anjou by Louis XI. of France, in 1473, René retired to Aix, in Provence, where he spent his last years, enjoying the esteem and love of his subjects. His work on tournaments, and some of his poems and paintings, are still extant. He died in Aix, Provence, July 10, 1480.

Renegade, one who renounces his religious faith and adopts another creed, more particularly one who renounces Christianity and becomes a Moslem; in a wider sense the word is practically synonymous with traitor, that is, one who deserts to the enemies of his country. A few of the most notorious renegades (in the latter sense) may be named. Hippas, son of Pisistratus, fought with Sparta against his country Athens, and later joined the Persians. Onomacritus, another Athenian, added his persuasions to

those of Hippias to induce Xerxes to invade Greece. Coriolanus led the Volscian armies against his native city Rome. Henry IV. of France (called "Henry of Navarre") renounced Protestantism before his coronation. During the Thirty Years' War there was a prominent renegade leader on each side: Count Mansfeld (II.) deserted the emperor and the Catholic cause; Pappenheim went over from the Protestants to the Roman Catholics. Archibald Campbell, 7th Earl of Argyll, was in 1619 declared a rebel for having entered the service of the King of Spain then at war with Great Britain. Mazeppa, the Cossack chief, fought against his sovereign at Pultowa in the army of Charles XII. of Sweden. The Duke of Ripperda, who won his laurels in the service of Spain (18th century), though he was by birth a Dutchman, is said to have embraced Islam and led the armies of Morocco against the Spaniards. Omar Pasha, who distinguished himself against the Russians in the Crimean War, was born a Christian in Croatia, but fled to the Turks and embraced Islam. Another pasha, Emin, the hero of the Equatorial Province of Africa, was a German Jew, who became a Mohammedan. See APOSTATE.

Renfrew, a town in Scotland, on the S. bank of the Clyde, 6 miles below Glasgow. Its charter of regality dates from 1396, but it was a burgh at least as early as the reign of David I. (1124-1153). A knoll called Castlehill commemorates the site of Renfrew castle, the original seat of the royal house of Stewart. The principal industries are shipbuilding and weaving.

Reniera, in zoölogy, the type-genus of *Renierinæ*, with 12 species. Sponges, easily crumbled, clump-like masses; canal system like that of *Halisarca*. Skeleton of four, five, or three sided, or polygonal meshes; spicules acerated, pointed, or rounded off, and connected by horny matter at their ends only. Distribution, probably world-wide.

Renierinæ, in zoölogy, a group including all sponges which resemble *Reniera* in having a skeleton formed of loose network of acerate or cylindrical spicules. Genera: *Amorphina*, *Pellina*, *Eumastia*, *Foliolina*, *Tedania*, *Schmidtia*, *Plicatella*, and *Auletta*. Distribution, world-wide. From the form of the Renierine sponges, it cannot be demonstrated that they occur fossil.

Rennell, James, an English geographer; born near Chudleigh, England, Dec. 3, 1742. He was employed in engineering and surveying work by the East India Company, and latterly held the appointment of surveyor-general of Bengal. After his retirement, he maintained a correspondence with many of the most learned men of Europe, giving to the world from time to time numerous geographical works of great value. These include "Bengal Atlas," "Memoir of

a Map of Hindustan," "Geographical System of Herodotus," "Treatise on the Comparative Geography of Western Asia," "On the Topography of the Plain of Troy," "Illustrations of the Expedition of Cyrus," etc. He died in London, March 29, 1830.

Rennes, the former capital of the province of Brittany, France, and now of the department of Ille-et-Vilaine; at the confluence of those two rivers; 234 miles W. S. W. of Paris and 51 S. S. E. of St. Malo. A seven days' fire in 1720 destroyed nearly 4,000 houses, and the ancient walls have been superseded by pleasant promenades, so that the place wears a modern aspect. Four bridges connect the upper or new town and the lower or old town, and the most noteworthy of the public buildings are the cathedral, finished in 1844, and Italian in style; Notre Dame, with its dome surmounted by a huge image of the Virgin; the archbishop's palace (1672); the stately courthouse (1618-1654); the university buildings (1855), with a picture gallery; the theater (1835); the Hôtel de Ville, with a public library; and the Lycée. As the focus of main and branch lines of railway between Paris and the N. W. of France, and commanding good river and canal navigation, Rennes is favorably situated for commerce; and, in addition to the transport of the abundant farm produce of the neighboring districts, it carries on a considerable trade in its own manufactures, which include sail cloth, table linen, etc. The second court-martial of Captain Dreyfus was held in Rennes during the summer of 1899. Pop. (1906) 75,640.

Rennet, an aqueous infusion of the dried stomach of the calf. It is a valuable agent in the coagulation of the casein of milk preparatory to the manufacture of cheese. It appears to contain a soluble ferment which acts directly on the milk. Also a variety, or rather several sub-varieties, of apple, with more or less spotted fruit; ground color gray, or golden. There is a French and a Canadian rennet; called also a queen.

Rennie, George, an English civil engineer, eldest son of John Rennie; born in Surrey, England, Jan. 3, 1791; educated at St. Paul's School, London, and at Edinburgh University. In 1811 he became associated with his father in business, and on his father's death he formed a partnership with his brother John, and afterward with his two sons. He constructed many of the great naval works at Sebastopol, Nicolaiev, Odessa, Cronstadt, and in the principal ports of England, built several English and continental railways and was the author of important works on engineering and allied subjects. He died March 30, 1866.

Rennie, John, an English civil engineer; born in Phantassie, Scotland, June 7, 1761;

educated at Dunbar and Edinburgh. He labored for some time as a workman in the employment of a millwright. He was afterward employed in London in the construction of machinery. Here his reputation rapidly increased, till he was regarded as standing at the head of the civil engineers of Great Britain. He built or designed numerous bridges, canals, docks, and harbors; among others, London Bridge across the Thames, the Crinan Canal, the Lancaster Canal, and the Avon and Kennet Canal; the London Docks, the East and West India Docks, and docks at Hull, Greenock, Leith, Liverpool, and Dublin; the harbors at Queensferry, Berwick, Howth, Holyhead, Kingstown, and Newhaven; and the government dockyards at Portsmouth, Chatham, Sheerness, and Plymouth. He died in London, Oct. 16, 1821.

Rennie, Sir John, an English engineer; younger son of the preceding; born in London in 1796; he succeeded his father as engineer of the Admiralty, completing many of the former's designs. Among these were the great system of drainage and land reclamation in Lincolnshire, and the erection of London Bridge, on the opening of which, in 1831, he was knighted. He was considered the highest authority of his time on all questions connected with hydraulic engineering, and was the author of an important work on harbors. He died Sept. 3, 1874.

Reno, Jesse Lee, an American military officer; born in Wheeling, W. Va., June 20, 1823; was graduated at the United States Military Academy in 1846; served in the Mexican War, participating in the actions at Cerro Gordo, Churubusco, Contreras, and Chapultepec, and in the siege of Vera Cruz; and was promoted 2d lieutenant in March, 1847. He was Assistant Professor of Mathematics in the United States Military Academy in January-July, 1849; served on various duties till July, 1860, when he was promoted captain and had charge of the arsenal at Leavenworth, Kan., in February-December, 1861. In November, 1861, he was appointed Brigadier-General of volunteers; distinguished himself at the capture of Roanoke Island and in the engagements at Newbern and Camden; was promoted Major-General of volunteers in July, 1862; and was present in the actions at Manassas and Chantilly. He was killed at South Mountain, Md., on Sept. 14, 1862, while leading a charge.

Reno, Jesse Wilford, an American inventor; born in Fort Leavenworth, Kan., Aug. 4, 1861; son of Maj.-Gen. Jesse L. Reno; was graduated at Lehigh University in 1883 and afterward took a special course in mining and engineering; was engaged in mining in Colorado in 1885-1890. He invented an inclined elevator or moving stairway in 1892, which has since been largely

introduced in department stores, amusement halls, etc.; and became president of the Inclined Elevator Company, New York, in 1895. His publications include technical articles in various scientific journals, and three papers on a subway rapid transit railway for New York, known as the "Reno System."

Reno, Marcus A., an American military officer; born in Illinois about 1835; was graduated at the United States Military Academy, and was appointed a brevet 2d lieutenant in the 1st Dragoons in 1857. He was promoted 2d lieutenant in 1858; 1st lieutenant, 1861; captain, 1861; and major, 1868; and was brevetted major for gallantry at Kelly's Ford, Va., in 1863; lieutenant-colonel for Cedar Creek, Va., in 1864; and colonel U. S. A., and Brigadier-General, U. S. V., for meritorious services during the war, in 1865; and was dismissed from the service April 1, 1880. In 1876 he took part in the campaign against the Sioux Indians, under Sitting Bull, as second in command of his regiment, in which Gen. George A. Custer and nearly all of his regiment were killed. For failing to support his comrades in the fight and for other serious charges he was dismissed from the service. He died in Washington, D. C., March 31, 1889.

Rent, a sum of money, or other valuable consideration, payable periodically for the use of lands or tenements; the return made to the owner by the occupier or user of any corporeal inheritance. It does not necessarily consist in money.

"Rent is an incorporeal hereditament, and signifies a comprehension or acknowledgment given for the possession of some corporeal inheritance, being defined as certain profit issuing yearly out of lands and tenements corporeal. It must issue out of lands and tenements corporeal; that it, from some inheritance whereunto the owner or grantee of the rent may have recourse to distrain. Therefore a rent cannot be reserved out of an advowson, a common, an office, a franchise, or the like. Rent is regularly due and payable upon the land from whence it issues, if no particular place is mentioned in the reservation. And strictly it is demandable and payable before the time of sunset of the day whereon it is reserved, though perhaps not absolutely due till midnight."—Blackstone.

Adam Smith considers rent as the price paid for the use of land. Ricardo and his followers considered that the rent of superior soils is equal to the difference between their produce and that of the worst soils cultivated. There is great doubt as to the accuracy of this view. Land let by a landlord to a tenant for purpose of cultivation is analogous to money lent to a borrower. The rent of the land is virtually the interest on the land viewed as a loan. See SINGLE TAX.

Renunciation, the act of renouncing a title; applied especially to the act of an executor, who, having been nominated in a will, and having the option of acting as such or not declines to act, and in order to

avoid any liability expressly renounces the office.

Renwick, Edward Sabine, an American patent expert; born in New York city, Jan. 3, 1823; was graduated at Columbia College in 1839; became superintendent of a large iron works plant at Wilkesbarre, Pa., but became an expert in patent cases in 1849. In 1862 with the assistance of his brother, he repaired a fracture, 82 feet long and 10 feet wide, in the bilge of the "Great Eastern," a feat which experts had pronounced impossible. He invented many mechanical devices, and published "Practical Invention" (1893).

Renwick, James, the last of the martyrs of the Covenant; born in Moniaive, Scotland, Feb. 15, 1662. He attended Edinburgh University with a view to the ministry, but was denied his degree, as he refused the oath of allegiance. He was chosen by the "Societies," as the bands of men devoted to the Covenant were called, to proceed to Holland to complete his studies in 1682, was ordained in 1683, and returned to Scotland. His life was now exposed to great hazards; he was obliged to move from place to place, and was often reduced to great destitution. In 1684 he published his "Apologetic Declaration," for which he was outlawed. When James II. came to the throne in 1685 Renwick with 200 men went to Sanquhar, and published a declaration rejecting him. A reward was offered for his capture, he was hunted from place to place, and made many hairbreadth escapes, but was at last captured in Edinburgh. He was condemned and executed, Feb. 17, 1688.

Renwick, James, an American author and physicist; born in Liverpool, England, May 30, 1792; was graduated at Columbia College, New York, in 1807. In 1820 he was made Professor of Chemistry and Physics in that college, a position he held till 1853. In 1838 he was appointed by the United States government one of the commissioners to explore the line of the boundary between Maine and New Brunswick. He wrote, besides smaller text-books and translations, "Outlines of Natural Philosophy" (1822-1823, the first extended work of its kind published in the United States), a "Treatise on the Steam Engine" (1830), several books on mechanics, and biographies of De Witt Clinton, Jay and Hamilton, and others. He died Jan. 12, 1863.

Renwick, James, an American architect; born in New York city, Nov. 3, 1818; son of the preceding; was graduated at Columbia College in 1836; first engaged in civil engineering; but later devoted himself to architecture. Among the many buildings which he planned are Grace Church, New York city, completed in 1845;

the Smithsonian Institution and the Corcoran Art Gallery, in Washington, D. C.; the Vassar College buildings in Poughkeepsie, N. Y.; the Young Men's Christian Association and St. Patrick's Cathedral (R. C.), in New York city. He died in New York city, June 23, 1895.

Rep, or Repp, a woolen dress fabric with a finely-ribbed surface, so woven that the ribs run transversely and not lengthwise as in corded fabrics.

Repairs, in law, is the term denoting the repairs done to a house or tenement by the landlord or tenant during the currency of a lease. In England, unless there is an express stipulation to the contrary, repairs fall to be performed by the tenant; but it is usually stated in the lease which party is to do the repairs. A tenant is not bound to repair damages by lightning or other natural casualty. In Scotland the landlord is bound at common law, independently of stipulation, to make all necessary repairs. In the United States, unless otherwise stipulated, repairs are made by the landlord; he must keep the property in a tenantable condition.

Repair Ships. See NAVAL FLEET.

Repassant, in heraldry, a term applied when two lions or other animals are borne going contrary ways, one of which is passant, by walking toward the dexter side of the shield in the usual way, and the other repassant by going toward the sinister. See PASSANT.

Repeal Movement, the name given to the agitation for the repeal of the Union between Great Britain and Ireland. This agitation commenced almost at the moment of the Union, and has continued to the present time. Robert Emmet sacrificed his life to the cause of repeal in 1803. But the word repeal is most intimately connected with the name and career of Daniel O'Connell, the Irish "Liberator." O'Connell died in 1847, and the cause of repeal was taken up by the Young Ireland party of 1848; by the Fenians, whose operations came to a head in 1865-1867; and finally by the Home Rule party organized under the leadership first of Isaac Butt, in 1870, and later under the leadership of Charles S. Parnell. During the celebrated Parnell Commission of 1888-1889, however, the Home Rule party, through their counsel, disclaimed all desire for repeal, maintaining that their aims were confined to the obtaining of Home Rule in the strict, or restricted, sense of the word.

Repeat, in music, a sign that a movement or part of a movement is to be twice performed. That which is to be repeated is generally included within dots in the spaces. When the performer does not, on repeating, go so far as the last dot sign, but

Repeater

finishes at a previous cadence, it is usual to write over the repeat, *Da Capo*, placing a pause and *Fine* over the chord at which the performer is to stop. See *SEGNO*.

Repeater, in arithmetic, an indeterminate decimal in which the same figures continually recur or are repeated. A pure repeater, or circulating decimal, is one in which the repetition goes on from the beginning; as, .3333272727 A mixed repeater is one in which the repetition does not begin till after the intervention of a figure or figures; as, .1288880113636, etc. Pure and mixed repeaters are generally written down only to the end of the first period, a dot being placed over the first and last figures of that period; thus, $\dot{.3}$ represents the pure repeater .333, and $\dot{.36}$ represents .3636, etc.; $\dot{.639}$ represents .639639, etc.; $\dot{.138}$ represents 13888, etc. The term is also applied to the dot or dots placed over the period repeated; the same as repetend. In firearms, an arm which may be caused to fire several successive shots without reloading; same as *REVOLVER* (*q. v.*). In horology, a watch or clock made to strike the time when a spring is pushed in. Some strike the hour and quarters, others the hour, quarter, and odd minutes. Nautically, a vessel, usually a frigate, appointed to attend each admiral in a fleet, and to repeat every signal he makes, with which she immediately sails to the ship for which it is intended, or the whole length of the fleet when the signal is general; called also a repeating ship. In telegraphy, the same as relay.

Repentance, or Repentaunce, the act of repenting; the state of being penitent; sorrow or regret for what has been done or left undone by one's self; especially sorrow and contrition for sin; such sorrow for the past as leads to amendment of life; penitence, contrition. (Matt. ix: 13.)

Two kinds of repentance are recognized in the New Testament: "Repentance to salvation not to be repented of," which is characterized by "godly sorrow"; and repentance characterized by "the sorrow of the world that worketh death" (II Cor. vii: 9, 10). The first mourns for sin not so much that it brings with it a penalty, as that it is offensive to God, who merits all love. (Psalm li: 4.) It is a divine gift (Acts v: 31, xi: 18; II Tim. ii: 25). The second kind of repentance mourns that sin is attended by a penalty rather than hates sin. There is no proper conviction that God in Christ is merciful, and in extreme cases there is despair followed by death (Matt. xxvii: 3-5).

Replevin, a personal action which lies to recover possession of goods or chattels

Reporting

wrongfully taken or detained, upon giving security to try the right to them in a court of law, and to return them if the suit be determined against the plaintiff. Originally a remedy peculiar to cases of wrongful distress, it is now applicable to all cases of wrongful taking or detention. Also the writ by which goods and chattels are replevined.

Replica, in the fine arts, the copy of a picture, etc., made by the artist who executed the original.

Reporting, an important branch of journalism; the act, system, or practice of making reports of meetings, debates, or the like. Accounts of single speeches, and at times of entire debates in the English Parliament, have come down to us from a very early period. The earlier volumes of the "Journals" of the House of Commons contain short notes of speeches; the later volumes record nothing but the votes and proceedings. Sir Symonds d'Ewes edited the "Journals of Queen Elizabeth's Parliaments," and the Commons "Journals" contain notes of speeches in the Parliaments of James I. Rushworth, assistant clerk in the Long Parliament, 1640, took down in a species of shorthand any speech of importance; and his account of "Remarkable Proceedings in Five Parliaments" forms one of the most valuable portions of his "Historical Collections." During the reign of William III. a member now and then sent a copy of his speech to the newspapers, for printing which, however, they were sometimes called to account. In the reign of Queen Anne, a monthly pamphlet, called the "Political State," gave an outline of the debates in Parliament. In the reign of George I. the "Historical Register," published annually, professed to give reports of parliamentary speeches. The "Gentleman's Magazine" began a monthly publication of the debates, the number for August, 1735, containing a report of the debate in the House of Lords on Jan. 23 previous. Cave, the publisher, continued the practice in succeeding numbers, and his systematic proceedings are thus described by Sir John Hawkins: "Taking with him a friend or two, he found means to procure for them and himself admission into the gallery of the House of Commons, or to some concealed station in the other house, and there they privately took down notes of the several speeches, and the general tendency and substance of the arguments. Thus furnished, Cave and his associates would adjourn to a neighboring tavern, and compare and adjust their notes; by means whereof, and the help of their memories, they became enabled to fix at least the substance of what they had lately heard and remarked. The reducing this crude matter into form was

the work of a future day and an abler hand—Guthrie, the historian, whom Cave retained for the purpose.” There was, however, no publication of the debates during the sitting of the Houses; Parliament was always prorogued before anything said in the course of the session was given in the magazine. At first the names of the speakers were cautiously indicated by the first and last letter only, and in many cases the speaker’s name was wholly omitted. Growing bolder by degrees, Cave printed the names at length. The House of Commons soon took the alarm. The publication of the debates of either House had been repeatedly declared to be a high breach of privilege—as by the Commons in 1588 and by the Lords in 1698. The Commons followed up several previous resolutions to the same effect by ordering, in 1728, “that it is an indignity to, and a breach of, the privilege of this House for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that on discovery of the authors, printers, or publishers of any such newspaper this House will proceed against the offenders with the utmost severity.” In 1738 Speaker Onslow called the attention of the House to the breach of its standing orders by Cave and others; and the result was another thundering resolution against the publication of debates “either while Parliament is sitting or during the recess,” and a threat to proceed against offenders with the “utmost severity.” The reports, notwithstanding, still appeared, but under the disguise of “Debates in the Senate of Lilliput,” in the “Gentleman’s Magazine,” and “Debates in the Political Club,” in the “London Magazine.” Dr. Samuel Johnson was employed by Cave in the composition of his parliamentary debates, and the reports from 1740 to 1743 are held to have been entirely prepared by him, sometimes with the assistance of the above-mentioned Guthrie. When it was observed to Johnson that he dealt out reason and eloquence pretty equally to both parties, he remarked: “I took care that the Whig dogs should not have the best of it.” It was not till 30 years later that the parliamentary debates descended from the magazines to the newspapers. The latter had, however, for some time resolved to report the debates, and they took advantage of the popular excitement arising out of the Luttrell-Wilkes election for Middlesex to try the right of the House to interdict the publication of its proceedings.

The ever-memorable contest between Parliament and the press began at the close of the year 1770. The House of Commons followed up another solemn threat by prompt action; and the Lord Mayor of London and

Alderman Oliver were sent to the Tower for refusing to arrest some printers of reports on the warrant of the Speaker, John Wilkes taking an active share in the controversy. The city of London loudly protested against the arbitrary proceedings of the House, and the whole country responded to the appeal. The power of Parliament to imprison ceases at the end of the current session, and on the day of prorogation, July 23, the Lord Mayor and Alderman Oliver marched out of the Tower in triumph, and at night the city was illuminated. In the next session the House of Commons tacitly acknowledged itself beaten. The printers defied the House, continued to publish their proceedings, and slept, notwithstanding, secure in their beds. In a short time the House of Lords also conceded the point, and the victory was complete; though it is still in the power of any member, who may call the Speaker’s attention to the fact that “strangers are present,” to exclude the public and reporters from the House. This power has frequently been exercised during living memory, but on such occasions some one or more members who have dissented from this course have taken notes of the speeches, and have avowedly sent them to the newspapers.

The old machinery of newspaper reporting was susceptible of immense improvement. One of the Woodfalls (a brother of the Woodfall of Junius) had so retentive a memory that when editor of the “Morning Chronicle,” he used to listen to a debate in the gallery, and write it out next day, the taking of notes being at that time forbidden. His successor established a corps of parliamentary reporters to attend the debates of both Houses every night in succession. He thus brought out the night’s debate on the following morning, anticipating his rivals by 10 or 12 hours. The improvement in the reports of the debates from the period of the American Revolution till the year 1815 was but gradual. At the close of the French war, however, the publication of parliamentary debates became an object of national importance, and in the course of a few years assumed its present full, detailed, and accurate character. Increased facilities for the discharge of their important and arduous duties were from time to time given to the reporters, who till then had no means of entering the Strangers’ Gallery except those which were common to the public generally. Among the professional parliamentary reporters of this period Charles Dickens was conspicuous. He was at work for the “Morning Chronicle” in 1834, and was one of the best reporters of his time.

The system of parliamentary reporting underwent a change of great importance about 1847, when the electric telegraph was

brought into general use by companies formed to work it. They proposed to supply papers out of London with London news, and a report of parliamentary debates was part of the news thus supplied. In order to get this report the telegraph company obtained admission to the gallery for its reporters, and thus broke the monopoly which the London daily newspapers had up to that time enjoyed. Subsequently, when the electric telegraphs passed into the hands of the government, the parliamentary reports for newspapers out of London were provided by press agencies, and the accommodation in the Reporters' Gallery had to be increased for them. With the growth of provincial newspapers the demand for more reports than the agencies supplied was felt, and the more powerful newspapers endeavored to secure special reports for themselves by the assistance of reporters who were engaged on the London press. In this way they were able to get and publish reports often much longer than those printed in London. This, however, was only done at great inconvenience, and an effort was made to obtain for the leading provincial newspapers a right of admission to the Reporters' Gallery. These claims were considered by a special committee of the House of Commons, which in 1879 reported in favor of them; next year the long coveted privilege was granted, and the representatives of some of the provincial papers take their regular "turns" (relieving one another at short intervals) along with those of the metropolitan dailies.

The methods of newspaper reporting in the United States have been developed to a degree of the greatest efficiency. It is usual for the reporter to be a proficient in the art of stenography as well as in that of mere literary composition. Further than this, in some of the large cities the reporter must also be an operator on a typewriting machine, in order that his "copy" may go to the compositor in its most legible shape. The rapidity with which reports of speeches, meetings, notable incidents, etc., are furnished to the press is something almost incredible to the uninitiated. The various press associations of the country are the principal factors in the work of disseminating the results of reportorial work, and greatly facilitate the interchange of intelligence between distant points.

Repousse, a term applied to a kind of ornamental metal work, formed in relief by striking on the metal from behind with a punch or hammer till the required forms are roughly produced in relief on the surface; the work is then finished by the process of chasing. The work of Benvenuto Cellini (1500-1570), in this branch of art,

is the most celebrated. Common work of this kind, as for tea or coffee pots, is executed in pewter and Britannia metal, and then electrotyped.

A writer in the "Scientific American" gives the following suggestions for producing a kind of repousse, which can be done at home as an art diversion:

This art, as practised by the silversmith and artist, is almost entirely dependent on the manual dexterity of the operator. The kind of repousse here suggested depends more on appliances than skill. It is not, however, assumed that any set of devices can be made to serve in lieu of taste and judgment.

To carry out this method, a piece of heavy cotton lace, or heavy openwork fabric, or a piece of a basket may be glued to a block of hard wood to serve as a sort of die for producing the impression in the metal. The fabric or basket work is not only attached to the block by means of glue, but its finer interstices are filled with glue, so as to present a surface resembling the original fabric only in the most general way. When the glue is perfectly dry and hard, the die is laid on a solid foundation, and a piece of very thin, soft copper or brass is secured to the block so as to cover the lace. A piece of cork about one-quarter inch thick and about three inches wide and six or eight inches long is laid over the metal, and struck with a mallet. The cork yields sufficiently to push the metal down on the die, and cause it to take the pattern of the lace or whatever is used in forming the die. A piece of rather hard rubber packing will answer this purpose in nearly all respects as well as the cork.

Designs may be cut from strong paper or pasteboard and glued to the block, or a stencil design may be sawed from hard wood. The lines and scrolls are discontinued in places, so as to cause the wood to hold together. If it is desired to render the lines continuous at these points, they may be run through with a V-tool. Dots are picked out with a small gouge or the point of a revolving drill. In all these cases the metal is attached to the block and treated as above.

Either panels or continuous strips may be embossed in the manner described, and these are to be used in making frames, vases, and various ornamental objects. If the metal is too thin for a certain case, it may be strengthened by flowing soft solder over the back of the plate by means of a soldering iron. As to finish, any of the several well known methods of oxidizing or lacquering may be employed.

Bas-reliefs may easily be made by a

method which is a modification of the one described.

To a wooden frame is fitted a board, on which is drawn in outline the sign which is to be produced in relief. The board may be of pine or any close-grained, soft wood for lead work; but for brass or copper, the wood should be hard. To the frame is attached the plate of metal by means of screws. The board is removed from the frame, and the portion of the design which is to form the most prominent feature of the relief is sawed out of the board, when the latter is replaced in the frame, and the metal is forced into the opening of the board by pressing on the surface of the lead opposite the hole in the board, or by pounding it by means of the mallet. As soon as this feature is complete, the next in order is sawed out of the board, and the operation is repeated till all of the general features are developed. The progress of the work can be observed at any time by removing the board.

The features may be corrected or modified by working from either side of the plate by means of the convex mallet and the wooden punches and chisels. If a support is desired for any part while the work is progressing, a stout bag filled with sand may be placed under the part. A few very small bags, say 1 inch or 1½ inches in diameter, will be found convenient. If desired, the drapery of the background may be chased by means of hard wood or metal punches, bearing the desired figures.

The relief, if of lead, looks well with an antique finish. This may be secured by rubbing the prominent portions of the relief with fine emery cloth, then going over the entire surface with a swab formed of a small roll of cotton cloth encircled by a coil of copper wire, the swab being dipped in dilute nitric acid before application to the relief.

The copper is dissolved and deposited on the bright prominent portions, while a dark deposit is made in the hollows, which when dry has a green tinge.

To give the work the appearance of antique iron the surface may be blackened by the application of a solution of sulphuret of potassium and the prominent portions may be semi-polished by briskly rubbing the entire surface with a piece of canvas or Brussels carpet.

Repplier, Agnes, an American essayist; born in Philadelphia in 1859. Her published works include: "Books and Men"; "Points of View"; "In the Dozy Hours"; "Essays in Idleness"; "Essays in Miniature"; "Varia"; and "Philadelphia: the Place and the People." She also compiled a "Book of Famous Verse," and was a contributor to the "Saturday Evening Post."

Representative, an individual standing as a type. The representative theory contended for by Swainson and other quinarists was that in each circle particular types were represented. In every circle of birds, for instance, there were raptorial, insessorial, rasorial, grallatorial, and natatorial types. Any representative of these was analogous to the corresponding type in all other circles. In law, one who stands in the place of another as heir, or in the right of succeeding to an estate of inheritance, or to a crown.

House of Representatives, the lower house of the United States Congress, and, in most States, of the Legislatures.

Representatives, House of, one of the branches of the Congress, also known as the Lower House and the Popular House. The members of this branch are elected directly by popular vote. In it is vested by the National Constitution the sole right to originate laws concerning the finances of the country. The Committee on Ways and Means of the House is the original source of all tariff legislation, and all bills providing for the raising or expenditure of public moneys have their origin in the House. In each of these two forms of legislation the House has the coöperation of the Senate, viz., the Senate may amend a tariff bill or resolution appropriating public moneys in any way it may choose; or it may substitute a new bill. The House has the privilege of passing on such changes by the Senate, and if it declines to accept any part of them, it is customary to appoint a Conference Committee consisting of an equal number of members from the House and Senate, to whom the disputed subject is referred, and the report of this committee is generally accepted in the light of a compromise by both houses. The membership of the House is based on the population of the country as ascertained decennially by the census, and therefore changes every 10 years. In the 61st Congress (1909-11), according to a statute of 1901, there were 391 representatives. See CONGRESS OF THE UNITED STATES.

Representative Government, that form of government in which either the whole of a nation, or that portion of it whose superior intelligence affords a sufficient guarantee for the proper exercise of the privilege, is called on to elect representatives or deputies charged with the power of controlling the public expenditure, imposing taxes, and assisting the executive in the framing of laws. See CONSTITUTION.

Reprieve, the suspension or delay of the carrying out of a sentence (generally of death) on a prisoner. It is popularly but erroneously supposed to signify a perma-

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ment remission, or commutation of a capital sentence.

Reprise, in maritime law, a ship recaptured from an enemy or pirate. If recaptured within 24 hours of her capture she must be restored to her owners in whole; if after that period, she is the lawful prize of her recaptors.

Reproaches, in the Roman ritual: *Improperia*, a series of antiphons and responses, forming part of the service which, on Good Friday, is substituted for the usual daily mass. The text is partly in Latin, partly in Greek, designed to illustrate the sorrowful remonstrance of our Lord with His people for their ingratitude. These reproaches were first sung to plain chant melodies, preserved in the *Graduale Romanum*, and still extensively used, but in the Sistine Chapel, since 1560, they have been sung to some exquisitely *faux bourdons*, to which they were adapted by Palestrina.

Reprobation, in ecclesiastical law, the propounding of exceptions to facts, persons, or things.

In theology, a term referring to the doctrine that certain persons are predestined to be finally lost. The word reprobation does not occur in the Authorized Version, or the Revised Version. *Reprobatio* was used by Tertullian, adopted by the Swiss theologians, and Anglicized as reprobation.

Reproduction, the term applied to the whole process whereby life is continued from generation to generation. One of the characteristics of life is its continuity; the races of animals and the orders of plants live on without marked change for centuries; by slow modifications they may be enriched or impoverished, increased or thinned, but there is no breach of continuity. All the forms of life seem to evolutionists like twigs on one many-branched tree; they are genetically related by near or distant bonds of kinship, and in a very real sense each generation is continuous with those which come before and after it. As an evergreen tree replaces by fresh growth those leaves which, it loses, so throughout the world, by various forms of reproduction the continuance of life is secured.

As reproduction is a fundamental fact of life, it cannot be discussed apart from other facts, such as growth, at the limit of which reproduction usually occurs, or development, in which the germ grows into the likeness of its parent, or the occurrence of two sexes producing complementary and mutually dependent reproductive elements. A theory of reproduction must be consistent with the facts of growth and development, and merges into theories of sex and heredity—the latter being based on a study of the

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precise relations between successive generations.

Modes of Reproduction.—Separated fragments of a sponge or cuttings from the rose, the buds of a hydra, or the bulbils of a lily, the eggs of a bird, and the seeds of plants are alike able to grow into new organisms; and thus we see that the common fact about all kinds of reproduction is that parts of one organism are separated to form or to help to form new lives. In many cases what is separated from the parent life is simply part of its body, an overgrowth or a definite bud, which, being set free, is able to reproduce the whole of which it is a representative sample. This is called asexual reproduction. In most cases, however, the parents give origin to special reproductive elements—egg cells and male cells—which combine and are together able to grow into a new life. This is called sexual reproduction.

The simplest forms of reproduction are found among the single-celled plants and animals. There we may find an organism like *Schizogenes*, multiplying by breakage, reproducing by rupture, presumably when the cell has overgrown its normal size; in others numerous buds are liberated at once, as in *Arcella* and *Pelomyxa*; in many, familiarly in the yeast plant, one bud is formed at a time; in most the cell divides into two or many daughter cells. The formation of many daughter cells or spores is little more than ordinary division taking place repeatedly in rapid succession, and within the substance of the parent cell—in other words, in limited time and space.

It has been shown that reproduction begins among single-celled organisms in a kind of rupture; but even among the more complex forms of life an equally crude mode of reproduction sometimes occurs. The cast-off arm of a starfish may regrow the entire animal with a readiness that suggests a habit; some kinds of worms (*e. g.*, *Nemertean*s) break into pieces, each of which is able to regrow the whole; large pieces of a sea anemone or of a sponge are sometimes separated off and form new organisms. It is easy to show experimentally that parts cut from a hydra, a sponge, or a sea anemone, from a seaweed, a moss, or a tree, may in certain conditions grow into an entire organism.

But the usual mode of asexual reproduction is by the formation of definite buds. When these buds remain continuous, colonial organisms result, like many sponges, most hydroids, Siphonophora like the Portuguese man-of-war, many corals, almost all the Polyzoa, and many Tunicates. The runners of a strawberry and the suckers which grow around a rose bush illustrate the same state. But in a few plants, like the liver-

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wort and the tiger lily, a kind of bud may be detached, and thus begin a new life. It is among animals, however, that the liberation of buds is best illustrated, for this mode of reproduction occurs in hydra and many hydroids, in some "worms," and in Polyzoa, and even in animals as highly organized as Tunicates. Budding is usually exhibited by comparatively simple and by sedentary animals, and seems indeed to be natural to vegetative organisms. It is easy to understand why asexual reproduction is among many-celled animals always associated with sexual reproduction, and entirely replaced by it in the higher forms. For budding is only possible when the organism is not very highly differentiated, or when part of the body retains many indifferent units; moreover, it is an expensive way of securing the continuance of generation, and is without the advantage to the species which undoubtedly results from the mingling of two life-currents in sexual reproduction.

Sexual reproduction in its fully differentiated form involves (a) the distinctness of two parent organisms, (b) the formation of two different kinds of reproductive elements—*e. g.* spermatozoa produced by the male and ova by the female, and (c) the fertilization of the egg cell by a male element. Moreover, the process of sexual reproduction also includes the sexual union of the two parents, or other ways in which fertilization is secured, while in some cases the fertilized ovum develops in organic relation with the mother organism, from which it is eventually separated as an embryo. But, while many organisms exhibit fully differentiated sexual reproduction, and while the essentials of the process are always the same, there are not a few important variations in detail—witness the occurrence of hermaphroditism, parthenogenesis, and alteration of generations, the first and last of which are discussed in separate articles.

Physiology of Reproduction.—All growth is, in a certain sense, of the nature of reproduction. It is an increase in the amount of protoplasm and its attendant train of substances. Abundance of food material and conditions favorable to rapid assimilation are necessarily accompanied by rapidity of growth; but in the most favoring circumstances there is an inevitable limit to the growth in size of a single cell. It occurs when the rate of assimilation of the constantly increasing mass of protoplasm becomes equal to the highest possible rate of absorption. Since absorption can only take place through the surfaces, and since, with any given figure of cell, the ratio of volume to surface is a perfectly definite rate as the cell grows, there must be for any

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given figure of cell a perfectly definite limit of size. For any mass of cells arranged in any manner there must be, for similar reasons (though other factors, such as weight, etc., may be operative and varyingly important), a definite limit of size. When in the single-celled animals this limit is reached, or is nearly reached so that starvation begins—and in any case the greater the size of the cell the less rapid, in proportion to volume, must be the absorption, unless at a certain point other factors at present unknown occur—then division of the cell takes place, by which means, the volume remaining the same, the surface is doubled, so that the ratio of volume to surface and therefore of assimilation to absorption is lowered, and growth is once more possible. This law (first clearly stated by Spencer and by Leuckart) is evidently the expression of a factor concerned in the initiation of cell division and therefore of the Metazoa, or many-celled animals. In the Protozoa, then, reproduction is related to, and in a certain sense caused by, a diminution in the possible rate of assimilation, which, to the protoplasm concerned, bears the aspect of an impaired nutrition. In the Metazoa, though reproduction is not so entirely a mere process of cell division as in the Protozoa, a connection between nutrition and reproduction is observable. The common hydra, with an abundant food supply and favoring circumstance, grows rapidly, the growth becoming a process of asexual reproduction and taking the form of the production of numerous buds, which may themselves produce a crop of secondary buds. But if the conditions become less favorable to nutrition through the lessening of the supply of food material, or, in terms of the more definite generalization emphasized above, less favorable to assimilation through say, a fall of temperature, then this rapid growth ceases and reproductive organs are formed and sexual reproduction takes place. Planarian worms in good nutritive conditions form asexual chains of daughter worms. A check to nutrition is followed by the separation and sexual maturity of the links.

Fruit trees are root-pruned in order that the crop of fruit may be abundant; the reason being that, as nutrition is lessened by such pruning, there follows an increase of reproductive activity which takes the form of fruit. If the vegetative activity of the plant be what one desires, then the flower buds are nipped off and sexual activity prevented. A similar result follows from the castration of animals. The position of the flower at the end of the vegetative axis is an expression of the fact that at that point the food supplies are more scanty than at any other point along the axis. This distribution of food matter is shown again

in such plants as the tiger lily, which have a mode of asexual reproduction, one that is of continuous growth, by the development of little bulbils which occur in the axis of the leaves, such bulbils being only found on the lower part of the stem. Other factors than the supply of food matter influence assimilation and reproduction. As in the case of all molecular movements, variations of temperature are an obvious cause of change of state. For every animal—*i. e.* for every peculiar form of protoplasm—there is a particular temperature which, other things being constant, is most favorable to rapidity of assimilation. This point is widely different in the various forms of life. In every case it is probable that a rise of temperature up to a certain point is followed by a feverish state of body and a tendency to hasten sexual maturity and reproduction. If our conception of the relation of assimilation to reproduction be correct, then, as already suggested, a fall of temperature below that most favorable to assimilation ought to be followed by an increasing tendency to sexual reproduction.

Reproductive maturity—the blossoming of the individual life—occurs, as has been shown, about the time when growth ceases. In the lower animals sexual maturity is attained relatively sooner than in the higher forms; but there are many strange cases of precocious and retarded reproduction. Thus we may contrast our common annuals and the “century plant” or American aloe, or some midges, worms, and even a couple of amphibians, which are reproductive during larval life, with highly evolved animals, such as the elephants. The physiology of reproduction must take account of that profound reaction which affects the whole system as sexual maturity is attained, of the various ways in which the reproductive elements are separated from the parents, of the relation which, alike in plant and animal, may be established between the fertilized egg cell and the mother organism, and of the way in which an embryo thus nurtured eventually becomes independent. Moreover, there are often highly evolved psychical activities associated with reproduction—notably the love between mates and between parents and offspring.

But, while reproduction is a blossoming of the individual life, it is also in a sense the beginning of death. The flower and fruit often end the life of the plant. It may be that the processes of rupture by which some of the simplest organisms reduce their bulk and multiply their kind are but a few steps from the more diffuse dissolution of death. It is a fact that in some simple animals—*e. g.* some “worms”—the parent, and especially the mother, ruptures and dies in liberating the repro-

ductive elements. So, among higher forms, not a few insects—mayflies, locusts, butterflies—die a few hours after reproduction. The exhaustion is fatal, and the males are sometimes victims as well as their mates. In higher organisms the fatality of the reproductive sacrifice has been greatly lessened, yet death may tragically occur, even in human life, as the direct nemesis of reproduction. In short, the process by which new lives begin, by which the continued life of the species is secured, tends to be antagonistic to the life of the parent individuals. The old leaves fall off the tree, and their places are filled by others.

Rate of Reproduction and Increase.—The rate of reproduction depends on the constitution of the individual organism and on its immediate environment and nutrition. The rate of increase, which is much more difficult to estimate, depends on the wide and complex conditions of life which are often included in the phrase “the struggle for existence.” While it is true that organisms sometimes exhibit an extraordinary increase in numbers in favorable areas and seasons, and while we know of many forms and even of whole races which have dwindled away and become extinct, the fluctuations in the numbers of plants and animals seem for the most part to be imperceptibly gradual. Their rate of reproduction is adjusted to the conditions of their life; the rise or fall of the population is seldom emphatic. The essay of Malthus (1798), in which he showed that the increase of human population tended to outrun the means of subsistence, but was met by various checks, afforded suggestions to Darwin and Wallace, who extended the induction of Malthus to plants and animals, recognizing in their increase the fundamental condition of the struggle for existence, and analyzing the checks as various forms of natural selection. But Herbert Spencer’s analysis of the laws of multiplication was even more penetrating. Including under the term individuation all those race-preservative processes by which individual life is completed and maintained, and under the term genesis all those processes aiding the formation and perfecting of new individuals, he showed both inductively and deductively that individuation and genesis vary inversely. Genesis decreases as individuation increases, but not quite so fast; in other words, progressive evolution in the direction of individuation is associated with a diminishing rate of reproduction.

Importance of Reproduction in Evolution.—As almost every individual life begins in the intimate union of two living units—the male cell and the egg cell—there is in the nature of the organisms beginning an evi-

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dent possibility of variation. The two cells, and more especially, the nuclei of the two cells, are intermingled; and in the vital combination which results new characteristics may be involved, old features may be strengthened, peculiarities may be averaged off. On fertilization as a source of variation, emphasis has been laid by Treviranus, Galton, Brooks, and others, while Hatschek regards the intermingling as an important counteractive of disadvantageous individual peculiarities, and Weismann finds in it the sole source of transmissible variations in many-celled animals.

In the individual life the antithesis between the reproductive and the nutritive functions has many expressions, and in terms of this antithesis not a few lines of variations can be rationalized. Thus, the shortening of the axis of the flower seems to be the result of a check imposed on the vegetative system by the reproduction function; thus, the development of gymnosperm into angiosperm suggests a continuous subordination of the reproductive carpellary leaf; thus, in almost every natural alliance of phanerogams may be read a contrast between more and less vegetative types, such as is seen within the limits of a single species in the transitions between the leafy kale and the cauliflower. Among animals the antithesis is expressed in different ways—as in the varied degree in which the reproductive individuals of a hydroid colony are differentiated from the nutritive members.

In considering the evolution of animals great importance is always—and rightly—attached to the self-preserving struggles and endeavors which secure the satisfaction of nutritive needs; but the species maintaining activities of reproduction have been not less important. Thus, Darwin insisted on the importance of sexual selection as a factor in evolution, and, though the criticisms of Wallace and others have lessened the cogency of Darwin's argument, there can be little doubt that courtship has aided in the evolution of the psychical life of animals. Romanes, too, in his insistence on the importance of isolation, recognizes "the reproductive factor in evolution." For by variations in the reproductive system a species may be divided into mutually sterile sets, which, prevented from intercrossing by this physiological barrier, are free to develop along divergent paths. In a very different connection, Robert Chambers emphasized the importance of "prolonged gestation," and Fiske has directed attention to the progressive influence of prolonged infancy, while Miss Buckley has well pointed out that an increase of parental care and sacrifice as seen in birds and mammals has surely been a factor in, as well as a result of, the general ascent of animals.

Reptilia

The increase of reproductive sacrifice which is observed in the evolution of mammals and in the progress through oviparous monotremes, prematurely-bearing marsupials, and various grades of placentals; the growth of parental care, and the frequent subordination of self-preserving to species-maintaining ends; and finally, the rise of sociality from foundations based in organic kinship, are well-known facts of animal life which suggest the importance of the reproductive factor in evolution.

Reptilia, reptiles; cold-blooded, oviparous, or ovoviviparous, vertebrate animals having the skin covered with scales or scutes; heart with two auricles, ventricular chamber incompletely divided. Respiration takes place by lungs, respiratory movements being slow and irregular. Intestinal tract and urogenital organs open into a common cloaca. When the appendicular parts of the skeleton are present, the sternum is never replaced by membrane bone, and the posterior sternal ribs are attached to a median prolongation of the sternum. The metatarsal bones are not ankylosed among themselves or with the distal tarsal bone. The fœtus is inclosed in an amnion and allantois, and nourished from the vitellus. Aristotle was the first naturalist who wrote on reptiles. Some progress in classification was made by Ray (1628-1705) and Linnæus (1707-1778). Brongniart, in 1799, first recognized the characters by which the BATRACHIA (*q. v.*) differ from other reptiles, and form a natural passage to the fishes. Oppel, Bibson, Duméril and Cuvier, Blainville, Merrem, Latreille, Gray and Wagler developed the subject. In 1863, in his Hunterian Lectures, Huxley adopted the term Sauroids for that division of the vertebrates which he afterward called Sauropsida. He divides the Reptilia into the following orders: *Chelonia*, *Flesiosauria*, *Lacertilia*, *Ophidia*, *Ichthyosauria*, *Crocodilia*, *Dicynodontia*, *Ornithoscelida*, and *Pterosauria*. Owen makes reptiles proper the highest of the five subclasses into which he finally divided his Hæmatocrya with orders:

Ichthyopterygia (extinct), *Sauropterygia* (extinct), *Anomodontia* (extinct), *Chelonia*, *Lacertilia* (with the extinct *Mosasaurus*, *Ophidia*, *Crocodilia* (with the extinct *Telcosaurus* and *Strepsopondylus*), *Dinosauria* (extinct), and *Pterosauria* (extinct).

Professor Mivart divides the Reptilia into the following orders:

Ichthyopterygia (extinct), *Anomodontia* (extinct), *Dinosauria* (extinct), *Ornithosauria* (extinct), *Crocodilia*, *Rhynchocephalia*, *Sauropterygia*, *Lacertilia*, *Ophidia*, and *Chelonia*.

The first appearance of reptiles is believed to be indicated by remains of a marine Saurian (*Eosaurus acadianus*) of Carboniferous age. Proterosaurus is found in the Permian. In Mesozoic times the reptilian type appears in such variety and in

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such a high state of development that this era has been distinguished as the Reptilian Age. In the Trias large marine Saurians and Dinosaurs are met with; more gigantic forms were developed in the Jurassic period; and the class attained its highest culmination in the Chalk.

Repton, a village of Derbyshire, England. Here was founded the first Christian church in Mercia, of which Repton for a while was the royal and episcopal capital. It was the seat from before 660 till its destruction by the Danes in 874 of a celebrated nunnery, as afterward of an Austin priory from 1172 till the Dissolution. Remains of this priory are incorporated in the buildings of the free grammar school, which, founded in 1556 by Sir John Porte, has risen to be one of the great English public schools.

Republic, a commonwealth; a form of political constitution in which the supreme power is vested, not in an hereditary ruler, but in the hands either of certain privileged members of the community or of the whole community. Theoretically, the purest and most perfect form of a republic is a state in which all the members of the community meet in public assembly to enact laws, and transact all other national business. Such a system is, however, practicable only in very small states, and has therefore given way in all modern republics to the representative system—that is, one in which the supreme power is vested in rulers chosen periodically by and from the whole body of the people, or by their representatives assembled in a congress or national assembly, as in the present French republic. The republics of Venice and Genoa were exclusive oligarchies, the supreme power being vested in the nobles or a few privileged persons. The republics of the United States and Switzerland are federal republics—that is, composed of a number of separate states bound together by compact, subject to a central government for all national purposes, but having powers of self-government in matters affecting individual states.

Republican Party, one of the two great political parties in the United States. The term Republican has had, at different times, different significations. In 1792 a faction of the Anti-Federalists, advocating more direct control of the government by the people, further restriction of supreme authority, and a stronger emphasis of State rights, began to be known as the Republican party. This party was increased by numbers of voters who called themselves Democrats on account of their sympathy with the French Jacobins. The combination was known officially as the Democratic-Republican party. Those members with centralizing tendencies seceded, and the term Democratic was alone retained. The name

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Republican, as the title of a party, went out of use after the election of 1824. From that date, for nearly thirty years, the two great parties were known as Whig and Democratic. The institution of slavery, which had asserted itself threateningly in the convention that formed the constitution, had come into politics as an important and ever-present factor. The Democratic was the distinctively pro-slavery party, while the Whig party was not positively anti-slavery. A small Free-Soil party, which included most of the radical abolitionists, came into the field occasionally, with the result that in 1844 it turned the election in favor of the Democrats, and in 1848 in favor of the Whigs. The struggle for the admission of Missouri as a State into the Union (1818-20) resulted in what was known as the Missouri Compromise. That Territory was admitted as a slave State, and a law was passed which provided that slavery should be forever prohibited in all other territory north of latitude 36° 30', which is the southern boundary of Missouri. This was considered a sacred compact, and it was hoped that it would prove a final settlement of the slavery question. But this expectation proved delusive. On the one hand the abolitionists continued their agitation for immediate and complete emancipation, and on the other the slaveholders showed a persistent determination to strengthen their hold on the government, with the oft-repeated threat of secession in case they considered their interests imperiled. In 1850 came a struggle over the admission of California into the Union, which was ended by more compromise measures, the principal of which were the admission of that State with a constitution prohibiting slavery, and the adoption of a fugitive-slave law which required every man in the Northern States to aid in the rendition of fugitives, and returned them to their masters at the expense of the government. In the election of 1852 the Whig party, having no positive principles, was so disastrously defeated that it was practically destroyed, and the new president, Franklin Pierce, confidently announced in his first message that the slavery question had been settled forever in favor of the institution. But there were two circumstances of which he took no account. Mrs. Stowe's novel, "Uncle Tom's Cabin," selling by the hundred thousand, presented such a vivid picture of the concrete horrors and injustice of slavery as the abolitionists, dealing mainly with abstract principles, had failed to produce. At the same time, a rising statesman, ambitious to be president, was contemplating still another great concession to the slave States. This came in the form of the Kansas-Nebraska Bill, introduced in the Senate by Stephen A. Douglas, passed

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by both houses, and signed by President Pierce. This law abolished the Missouri Compromise, and provided that the Territories of Kansas and Nebraska might come into the Union as States with constitutions either permitting or prohibiting slavery, as the people might vote. This was known as the principle of popular sovereignty, called by its opponents "squatter sovereignty." The attempt to apply it in Kansas resulted in civil war in that Territory, for large numbers of armed men crossed the border from the slave States, to vote for slavery and then return home, while organizations were formed to send thither large numbers of armed emigrants from the free States. All power that the national government could exert was brought to bear in favor of slavery. When the people of the North witnessed the abolition of the Missouri Compromise (held sacred for thirty-four years) and saw the logical result in actual civil warfare, large numbers of them realized for the first time the aggressive nature of the slave power. Then arose a practical and powerful anti-slavery party—not one that called for immediate abolition of the institution in the States where it existed, but one that was determined to prevent the enlargement of its domain.

On Feb. 28, 1854, at an enthusiastic public meeting called by Maj. Alvan E. Bovay at Ripon, Fond du Lac co., Wis., it was resolved, in case the Kansas-Nebraska Bill should pass, to "throw old party organizations to the winds and organize a new party on the sole issue of the non-extension of slavery." At a second meeting, held on March 20, Bovay suggested for such a party the name "Republican." The bill was signed on May 30. On July 6, at a great mass-meeting held in Jackson, Mich., the name "Republican" was first formally given to the fusion of Whigs, Free-Soilers, many Know-Nothings, and such Democrats as were opposed to the extension of slavery. And following closely came similar action in other States, notably in Massachusetts, where Robert Carter, editor of the "Commonwealth," called a convention to meet in Worcester, July 20, which was so large that no hall could accommodate it, and it had to be held in the open air. A platform drawn up by Carter was adopted, together with the name Republican. The new party sprang at once into national importance, being organized in all the free States. Its first national triumph was the election of Nathaniel P. Banks, of Massachusetts, as Speaker of the House of Representatives in the Congress of 1855-56. But this was not accomplished till two months had been spent over a triple contest (a majority being required to elect), and at last the plurality rule was adopted and Banks was chosen on the 133d ballot.

President Pierce increased the alarm of

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the opponents of slavery and strengthened their cause by instructing James Buchanan, John Y. Mason and Pierre Soulé—United States ministers at the courts of London, Paris and Madrid—to meet and discuss the Cuban question. They met at Ostend, and issued a manifesto (Oct. 9, 1854), declaring that the United States should offer to buy Cuba, and, if Spain refused to sell, should take it by force. It was generally believed that the purpose of this was, simply and solely, to add another slave State to the Union. Filibustering expeditions against that island had been undertaken with the same end in view. Senator Charles Sumner, of Massachusetts, was one of the most uncompromising opponents of slavery. On May 19 and 20, 1856, he delivered in the Senate a speech denouncing "the crime against Kansas," meaning thereby the attempt of the pro-slavery element, backed by the Federal administration, to make that Territory a slave State against the wishes of a majority of the *bona fide* settlers. Two days later, because of certain bitter personal allusions in this speech, Sumner was attacked in the Senate chamber by Preston S. Brooks, a member of Congress from South Carolina, who took him at disadvantage as he was sitting at his desk, and with heavy blows on the head, with a cane, beat him into insensibility. A motion to expel the congressman failed to receive the necessary vote of two-thirds, but he resigned and offered himself for re-election. His constituents by a unanimous vote returned him to his seat. This incident strengthened enormously the anti-slavery sentiment in the free States, and inspired the new party with a determination quite equal to that of its older opponent.

A convention was held in Pittsburg, Feb. 22, 1856, at which a national organization was effected, and on June 17 the first national convention for making nominations assembled in Philadelphia. John C. Frémont, of California, was nominated for the presidency, and William L. Dayton, of New Jersey, for the vice-presidency. The platform condemned polygamy and slavery as "twin relics of barbarism"; demanded the admission of Kansas as a free State; advocated the building of a railroad to the Pacific; and insisted that appropriations for river and harbor improvements were constitutional. Frémont received 114 electoral votes, and James Buchanan (Democrat) 174. The popular vote cast for Frémont was 1,341,254, against 1,838,169 for Buchanan. At the end of 1857 the Republican party, pledged to resist the extension of slavery into the Territories, controlled eleven States, and contested others at the elections. At the opening of the first session of the Thirty-sixth Congress, December, 1859, the Democrats were in the ma-

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jority, having 38 out of 66 members of the Senate, and 93 administration Democrats, and 31 others, against 113 Republicans in the House.

Abraham Lincoln was nominated for the presidency on the third ballot, at the second Republican national convention, held in Chicago, May 16, 1860. The platform included protests against all "schemes for disunion;" interference with State rights in domestic affairs; the "sectional" policy of the Democrats; changes in the naturalization laws; extravagant public expenditures; extension of slavery; and the sale to others of public lands held by actual settlers. Revision of duties on imports was advocated.

It had been confidently expected that William H. Seward, of New York, would receive the nomination, and his name led on the first two ballots. But Lincoln was by no means the obscure man that he is often represented to have been. He had served one term in Congress; he had served four terms in the Illinois legislature, where he had carried through important bills; in the national convention of 1856 he had received 110 votes for the vice-presidential nomination; he was recognized as one of the ablest lawyers in his State; above all, in the summer of 1858 he had met Stephen A. Douglas in a series of debates on the political issues, which attracted attention throughout the country, and had carried the State against him by 4,000, though the peculiar arrangement of the districts enabled Douglas to secure a reelection to the United States Senate. And finally, on Feb. 27, 1860, Lincoln had delivered in New York one of the most memorable speeches in our history.

In the Democratic national convention, held in Charleston, S. C., Douglas was unable to obtain a majority of the votes, largely for the reason that in the debates with Lincoln he had been driven to a virtual repudiation of the doctrine set forth in the Dred Scott decision. The convention split, reunited and convened again in Baltimore, and split again and finally. John C. Breckinridge was nominated by the extreme pro-slavery Democrats, and Douglas by the more moderate wing of the party; while a party made up of old-line Whigs and Know-Nothings, calling itself "Constitutional-Union," nominated John Bell. The election in November gave Lincoln 180 electoral votes, Breckinridge, 72, Bell, 39, and Douglas, 12. Hannibal Hamlin, of Maine, was elected vice-president on the ticket with Lincoln. Within a few weeks after the election, the Cotton States, led by South Carolina, declared themselves out of the Union, though the Congress elected at the same time with President Lincoln was politically opposed to him.

During the Civil War (April, 1861, to April, 1865) the Republicans in the free

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States formed the distinctive war party. But large numbers from the other party voted with them and were known as "War Democrats." Still others, while voting steadily against the administration, gave hearty practical support to the war for the Union. A small minority in the North, called "Copperheads," were more loud than effective in their opposition. In his inaugural address President Lincoln announced the policy of the administration to be one of conciliation, conservation, and restoration; this attitude taking the place of the timid concession policy of his immediate predecessor. In 1861 he called for 657,743 volunteers to suppress the rebellion. He asked Congress for \$400,000,000 for war expenses, and a loan of \$250,000,000 was sanctioned. A specific-duty protectionist tariff bill was passed in 1861, and a liberal homestead law. There had been many unsuccessful attempts to enact such a law, the Democratic party steadily opposing it. In 1862 the issue of \$150,000,000 in legal tender notes was authorized. These became known as "greenbacks." Other measures passed were those providing for internal revenue; forbidding slavery and polygamy in the Territories; and chartering the Union Pacific Railroad.

The record of the administration in 1863 was notable. A Bureau of Currency and national banks were established, and a loan of \$900,000,000 was provided for—\$300,000,000 for the current year, the remainder for 1864. The slavery question and the war were dealt with in several ways. On New Year's Day the President issued a proclamation declaring free all slaves in States or parts of States that were then in rebellion, and announcing that colored men would now be received into the army as soldiers. The Habeas Corpus Act was suspended in March. A draft of 300,000 men was ordered in June; 300,000 volunteers were called for in October. In December a proclamation of amnesty was issued. The Fugitive Slave Law (*q. v.*) was repealed in 1864. The President's calls for drafted men and volunteers in that year aggregated 1,500,000 men. Congress authorized the issue of \$600,000,000 in bonds. The postal money-order system was established.

There was a split in the party in May. The "Radicals" met at Cleveland, Ohio, denounced the administration, and nominated Gens. John C. Frémont and John Cochrane for president and vice-president; but before the election they withdrew. In July the President refused to sign a bill passed by Congress for reconstruction of the Southern States. In the same month a new tariff bill went into effect.

By a convention held in Baltimore, June 8, 1864, Lincoln was renominated, with Andrew Johnson, of Tennessee, for vice-president. The platform declared that

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the war must be pushed to success, with no compromise, approved the Emancipation Proclamation (*q. v.*), advocated the encouragement of foreign immigration, and reaffirmed the Monroe Doctrine (*q. v.*). The Democratic platform declared that the war was a failure, and some peaceable means should be used for restoring the Union. Lincoln received 212 electoral votes, and Gen. George B. McClellan, the Democratic candidate, 21. The popular vote cast in Lincoln's favor was 2,203,831, against 1,808,725 for McClellan. The last war loan of \$600,000,000 was authorized in March, 1865. On April 9, Gen. Robert E. Lee surrendered his army to General Grant at Appomattox. On April 14, President Lincoln was assassinated, and the day following Andrew Johnson, Vice-President, succeeded to the presidency. His policy regarding the reconstruction of the seceded States, when fully developed, failed to satisfy the Republican party leaders, because the temporarily restored Southern legislatures had passed laws calculated to nullify emancipation. Congress finally passed a reconstruction measure over the President's veto (see RECONSTRUCTION). The Thirteenth Amendment to the Federal Constitution, abolishing slavery, went into force in December, 1865. The Fourteenth Amendment, securing civil rights to freedmen, became effective in July, 1868. These were Republican measures, opposed by Democrats. The differences between Johnson and the Republican party led to efforts in the direction of curtailing his power. He was deprived of the right to issue an amnesty proclamation in January, 1867, but he refused to submit; the command of the army was practically withdrawn from him, and the power of removal of civil officers without the consent of the Senate was also taken away. Disagreements arising out of the removal by President Johnson of Edwin M. Stanton, Secretary of War, led to the President's impeachment. After a trial extending over two months (see IMPEACHMENT), the vote stood 35 for conviction and 19 for acquittal, thus barely failing of the two-thirds necessary to convict. The treaty with Russia for the purchase of Alaska, secured by Secretary Seward, was concluded in 1867.

Gen. Ulysses S. Grant received the Republican nomination for the presidency in 1868, with Schuyler Colfax for vice-president. The platform denounced repudiation of public indebtedness; called for equalization and reduction of taxation; advocated the adoption of an adequate pension system; insisted on proper protection of all citizens, native or naturalized, against arrest or imprisonment by foreign powers for acts done or words spoken in the United States; and urged encouragement of immigration. Grant received 214 electoral votes,

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and Horatio Seymour (Democrat) 80. The popular vote cast in Grant's favor was 3,015,017, against 2,709,613 for Seymour. The policy of reconstruction was vigorously pursued during Grant's administration. The Fifteenth Amendment, conferring the right of suffrage on the freedmen, was declared in force in 1870. Congress rejected the President's plan to establish a harbor and naval station and a partial protectorate in Santo Domingo. Efforts were made to inaugurate civil-service reform, but without success. A Labor Reform party sprang up from the trades-union movement. The Grangers, or Patrons of Husbandry (see HUSBANDRY, PATRONS OF), a farmers' organization, also came into being. Several other parties attained a national character during the Grant administration, including the Prohibition party, the Greenback party, the Straight-out Democrats, and the Liberal Republican party (*q. v.*).

Grant was renominated in 1872 with Henry Wilson, of Massachusetts, for vice-president. The platform approved the Fifteenth Amendment; recommended reform of the civil service; retention of the national domain for free homes; tariff revision; generous pension laws; abolition of the franking privilege; adjustment of the relations between capital and labor; consideration of women's rights; and furtherance of American commerce and ship-building. President Grant received 286 electoral votes, and Thomas A. Hendricks (Democrat) 42. The popular vote cast in Grant's favor was 3,597,070, against 2,834,679 for Horace Greeley, nominee of the Democratic and Liberal Republican parties, who died before the casting of the electoral votes. The second administration of Grant brought him face to face with many difficulties connected with State governments. In the reconstructed States there were numerous disturbances. Freedmen, in alliance with white politicians, at first held control in these States. Finally, the ex-Confederates and those who were in sympathy with them regained almost complete political control in several States. Much anxiety was felt throughout the country regarding the financial situation. The President favored specie payment. Many of the people and their representatives in Congress preferred an increase of paper currency. Resumption of specie payment was provided for in 1875, and took effect, without difficulty, Jan. 1, 1879 (see RESUMPTION).

Rutherford B. Hayes was nominated for the presidency in 1876, with William A. Wheeler, of New York, for vice-president. The platform advocated complete pacification of the South, protested against sectarian education at the public expense, called for an investigation as to Chinese immigration, and condemned polygamy. Hayes, whose election was disputed, finally,

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by decision of the Electoral Commission (*q. v.*), received 185 electoral votes, his Democratic opponent, Samuel J. Tilden, being credited with 184. The popular vote, as counted, was, for Hayes 4,033,975, against 4,284,873 for Tilden. The Hayes administration was marked by the exercise on the President's part of a policy of conciliation. Federal troops were withdrawn from the South, and those States immediately fell into the control of those who had governed them before the war. A bill providing for free coinage passed the House of Representatives, when a compromise measure known as the Bland bill was substituted for it. This provided that the Treasury should purchase bullion enough to coin \$2,000,000 a month in silver dollars, to be legal tender. President Hayes vetoed the bill, and it was passed over his veto.

James Abram Garfield was nominated for the presidency in 1880, with Chester A. Arthur, of New York, for vice-president. The platform was devoted largely to a review of the Republican record. A complete reform of the civil service was called for. Garfield received 214 electoral votes, and Winfield Scott Hancock (Democrat) 155. The popular vote, as counted, was for Garfield 4,454,416, against 4,444,952 for Hancock. Early in the Garfield administration a controversy arose between the President and Senator Roscoe Conkling, of New York, respecting appointments, which led Conkling and his colleague Platt to resign their seats in the Senate. The President was shot on July 2, 1881, by an assassin, and lingered till Sept. 19, when he died, and Vice-President Arthur succeeded to the presidential office. One of the chief events during President Arthur's term was the appointment of a Tariff Commission in 1882, consisting of nine civilians. The Chinese-Exclusion Act became effective in the same year, and a comprehensive Civil-Service Reform Bill was signed in 1883.

In 1884 James Gillespie Blaine, of Maine, was nominated on the fourth ballot for the presidency, with Gen. John A. Logan, of Illinois, for vice-president. The platform pledged the party to correct the irregularities of the tariff, and to reduce the surplus; at the same time it advocated protection for home industry. The party declared itself in favor of international bimetallism (see BIMETALLISM); regulation of transportation; establishment of a labor bureau; prohibition of foreign contract labor; protection of the sheep-raising industry; resumption of forfeited land grants; withholding of land grants from aliens; regulation of interstate commerce; and increase of the navy. Blaine received 182 electoral votes, and Grover Cleveland (Democrat) 219. The popular vote, as counted, gave Blaine 4,851,981, against 4,874,986 for Cleveland. As the vote was

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counted, the State of New York was carried for Cleveland by a plurality of about 1,100. But Gen. Benjamin F. Butler was nominated as an independent candidate and polled a considerable vote; and it became known that a large number of the votes cast for him in New York and Brooklyn had been counted for Cleveland, and that in fact Blaine had carried New York by about 1,500, which should have given him the presidency.

In this campaign a favorite argument of the Democrats was, "A party so long in power must be corrupt. Let us see the books." When they assumed the government in March, 1885, they found in the treasury every cent that should be there; and while they had possession of all the books for four years, if they discovered any instance of malfeasance, they failed to proclaim it.

In 1888 Benjamin Harrison, of Indiana, was nominated on the eighth ballot for the presidency, with Levi P. Morton, of New York, for vice-president. The platform declared for a protective tariff, and against combinations and trusts; advocated home rule in the Territories with admission to the Union as soon as qualified; urged Federal aid for public schools; favored civil-service reform, bimetallism and reduction of letter postage to one cent; and called for the defense of fishing-rights in the Northeast. Harrison received 233 electoral votes, carrying every Northern State except Connecticut and New Jersey, and Grover Cleveland (Democrat) 168. The popular vote, as counted, was, for Harrison 5,440,708, against 5,536,242 for Cleveland. The currency question was a leading issue in the Harrison administration. In 1890 a bill (called the Sherman Act) was passed, authorizing the purchase each month of 4,500,000 ounces of silver bullion at market prices, treasury notes to that amount (legal tender in all cases) to be issued. The McKinley tariff bill was signed by the President Oct. 6 (see MCKINLEY ACT). The Republican Congress also passed an international copyright law and made liberal appropriations for enlarging the navy. Six States—Idaho, Montana, North Dakota, South Dakota, Washington and Wyoming—were admitted to the Union during the Harrison administration. The annexation of Hawaii was arranged, but the treaty was still in the hands of a Senate committee when the presidential term ended, and the succeeding president, Cleveland, withdrew it. By the elections of 1890 the Republicans lost control of the House of Representatives. President Harrison was renominated in 1892, with Whitelaw Reid, of New York, for vice-president. The platform, on the currency question, demanded the use of both gold and silver as standard money, in such a way as to secure the parity of value of the two metals, so that the purchasing and

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debt-paying power of the dollar, whether silver, gold, or paper, should be at all times equal. An international conference on bimetallism was advocated. Acquisition of the Nicaragua canal was urged. Cession of arid lands to the States and Territories to which they belonged, extension of hearty support to the World's Columbian Exposition, and establishment of a rural-delivery postal system were also among the measures favored in the platform. Harrison received 145 electoral votes, Grover Cleveland (Democrat) 277, and James B. Weaver (Populist) 22. The popular vote, as counted, was, for Harrison 5,175,201, against 5,554,267 for Cleveland. The defeat of the party, Republicans held, was due mainly to misrepresentation and fear of the McKinley tariff, which they believed was passed too late to have a fair trial before the election. A serious business depression followed almost immediately, and this was not relieved by the repeal of the Sherman Act. In 1894 the Congressional elections gave the Republican party an overwhelming majority in the House.

William McKinley, of Ohio, was nominated for the presidency in 1896, with Garret A. Hobart for vice-president. The platform approved the policy of a protective tariff; advocated reciprocity; encouragement of sugar-growing in the United States; protection of wool and woolen industries; development of the merchant marine service by restoring the American policy of discriminating duties; the gold standard; liberal pensions; a vigorous foreign policy; the upholding of the Monroe Doctrine; friendly intervention in Cuba; enlargement of the navy; prohibition of illiterate immigration; maintenance of the civil-service laws; international arbitration; free homesteads; admission of Territories; and extended rights for women. It condemned lynching. The Democratic candidate was William J. Bryan, the foremost advocate of free coinage of silver at the ratio of 16 to 1, and the contest turned almost wholly on that issue. McKinley received 271 electoral votes, and Bryan 176. The popular vote, as counted, gave McKinley 7,204,779, against 6,502,925 for Bryan. In the preceding administration the Democratic Congress had passed a tariff bill that President Cleveland refused to sign and denounced, though it became a law without his signature. President McKinley's first act was to call a special session of Congress, at which was passed, July 24, 1897, a protective-tariff measure known as the Dingley bill. Important legislation under the McKinley administration included a grant of \$50,000 for relief of destitute citizens of the United States in Cuba; a grant of \$50,000,000 to meet war expenses in the event of war with Spain (see SPANISH-AMERICAN WAR); provision for the Twelfth

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Census; provision for free homesteads, and for reorganization of the army; and annexation of the Hawaiian islands.

President McKinley was renominated in 1900, with Theodore Roosevelt, of New York, for vice-president; and Bryan was renominated by the Democratic party. The platform reiterated sentiments previously expressed regarding the gold standard, free-silver coinage, the trusts, a protective tariff, reciprocity, immigration, aid to American shipping, liberal pensions, civil-service reform, statehood for the Territories, and Cuban independence. It was insisted that the Fifteenth Amendment be lived up to in the South at elections. Declarations were made in favor of improved roads and highways; rural free delivery of postal matter; reduction of the Spanish War taxes; new markets for surplus farm products; a liberal policy in the Philippines; a Department of Commerce; and protection of American citizens abroad. But the main popular issue, as before, was the question between a gold standard and free coinage of silver at the ratio of 16 to 1. McKinley received 292 electoral votes, and Bryan 155. The popular vote, as counted, gave McKinley 7,215,696, against 6,351,608 for Bryan. President McKinley was shot by an assassin Sept. 6, 1901, and died Sept. 14. Theodore Roosevelt, Vice-President, succeeded him.

Under President Roosevelt's administration, the measures passed in Congress included the establishing of a permanent Census Bureau; repeal of the Spanish War taxes; a Chinese-Exclusion Act; and rural free delivery of mail matter. The Department of Commerce and Labor was created, the army was reorganized, a vigorous foreign policy was maintained, and several important treaties with various nations were concluded. The United States government recognized the independence of the Republic of Panama, and on Feb. 26, 1904, a final treaty for the Panama canal was proclaimed.

In 1904 Roosevelt was nominated by the Republicans for president, with Charles W. Fairbanks, of Indiana, for vice-president. The platform rehearsed the party's achievements during the half-century of its existence; insisted upon the maintenance of protection and of the gold standard; favored an increased merchant marine; proportional reduction of representation in Congress for any State that should unconstitutionally limit the elective franchise; and equal subjection of combinations of capital and labor to the laws. Roosevelt received 336 electoral votes, and Alton B. Parker (Democrat) 140. The popular vote, as counted, gave Roosevelt 7,623,486, against 5,077,971 for Parker. During President Roosevelt's second term the United States Government became a party to a plan for

Republican River

liquidating the foreign debts of Santo Domingo; prosecutions of the Paper Trust and the Beef Trust were entered upon; persons implicated in land frauds were prosecuted, as also were offenders in the Post-Office Department and other branches of the government service; a movement for the fixing of railway rates by the Interstate Commerce Commission was undertaken; and plans for constructing the Panama canal were forwarded. In 1905 President Roosevelt was notably successful in bringing the peace commissioners of Russia and Japan to an agreement (see RUSSO-JAPANESE WAR).

The notable achievements of the Republican party, in the half-century of its existence, are these: Prevention of secession and establishment of national sovereignty, as opposed to State sovereignty (not to State rights); abolition of slavery; a homestead law; establishment of a national banking system, with uniform and sound currency; resumption of specie payments without financial disturbance; establishment of the gold standard; registration laws, to secure fair elections (almost everywhere opposed by the Democratic party); forbidding polygamy; encouraging and aiding the building of a transcontinental railroad; a protective tariff; the postal money-order system, and free rural mail delivery; liberal pensions to soldiers; acquisition of Alaska; increase of the navy; acquisition of Hawaii; successful war with Spain, resulting in the freeing of Cuba and acquisition of Porto Rico and the Philippines; an international copyright law; establishment of a permanent Census Bureau; and prosecution of trusts.

Consult: Curtis, "The Republican Party" (1904); Johnston, "History of American Politics" (1879, since revised and enlarged); Macy, "Political Parties in the United States (1846-1861)" (1900); Nicolay and Hay, "Abraham Lincoln, a History" (1890); Ostrogorski, "Democracy and the Organization of Political Parties" (1902); Patton and Lord, "History and Government of the United States" (1903); Rhodes, "History of the United States from the Compromise of 1850" (1896); Wilson, "Rise and Fall of the Slave Power" (1872); Woodburn, "Political Parties and Party Problems in the United States" (1903).

ROSSITER JOHNSON.

Republican River, one of the head streams of the Kansas river. Rising by several forks or branches in the E. part of Colorado, it runs E. into Nebraska, following the same general direction as far as lon. 98° W., where it reaches the N. boundary of Kansas. Entering that State, it flows S. E. to Geary co., and at Junction City unites with the Smoky Hill river to form the Kansas river. The length of the Republican river is estimated at about 550 miles.

Repulsion

Republication, in law, a second publication of a former will. Such republication is usually made after canceling or revoking, or in case of questionable validity, or on certain other grounds relating to the saving of labor or to secure the standing of the will. According to legal usage, "the republication of a former will revokes one of a later date and establishes the first again."

Repudiation, an unprincipled method for the extinguishment of a debt, by simply refusing to acknowledge the obligation. The 11th amendment of the Constitution of the United States prohibits citizens of another or a foreign State from bringing suits against a State in the federal courts; while the individual States, not being independent sovereigns, could only be called to account by a foreign power through the national government. Reprisals or war are thus as impossible as a suit at law, and there is really no means by which the States can be compelled to recognize and meet their obligations. Twice in the history of the country have several States taken advantage of this condition of affairs—once after the commercial crisis of 1839, in which the United States Bank stopped payment, and again in the years following the Civil War. In the latter period Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas were among the defaulters. Virginia, indeed, refused payment chiefly on the ground that no part of its existing debt had been allocated to West Virginia when the latter was separated as a State in 1863; and later acts of repudiation found a local justification in the same grievance. But in the other States repudiation is to be traced to the effects of the war and to the unsettled government which ensued. The war had left commerce in these States prostrate and paralyzed, and especially was it necessary that railways should be rebuilt and new roads constructed; and to this end the public credit was pledged, often recklessly and at ruinous rates. In most cases the debts created in aid of railways were repudiated on the ground that the money had been obtained collusively and with no proper return of benefit to the States: North Carolina thus wiped off an obligation of more than \$12,000,000. The other States mostly based their action on decisions of their own courts or on the action of their own Legislatures.

Repulsion, in physics, the force which compels certain bodies or their particles to recede from each other. No repulsion exists between bodies at sensible distances, except when they are in certain electric or magnetic states, in which case the repulsions between them are in the inverse ratio of the square of the distance. At insensible distances, some influence keeps the particles

Reputed Owner

of a body from being in absolute contact, whence results the phenomenon of elasticity. The motions produced by heat are also a cause of strong molecular repulsion. The molecules of gases are always in a state of mutual repulsion.

Reputed Owner, in law, one who has to all appearance the actual possession and ownership of property. When a reputed owner becomes bankrupt, all goods and chattels in his possession may in general, with the consent of the true owner, be claimed by the trustee for the benefit of the creditors.

Requests, Court of, an ancient court of equity in England, inferior to the Court of Chancery, and abolished 1641. Also, a local tribunal (known likewise by the name of Court of Conscience) instituted in London by Henry VIII. for the recovery of small debts. Similar local tribunals elsewhere have all been superseded by the county courts.

Requiem, in the Roman Catholic Church, a solemn musical mass for the dead, which begins in Latin, "*Requiem æternam dona eis*," etc., "Give to them eternal rest," etc. Mozart, Jomelli, and Cherubini composed famous requiems.

Reredos, the screen at the back of an altar. It is sometimes composed of sculptured work in tabernacles, niches, and statuary of a very sumptuous character, and at other times of simple painted wall decorations in geometric patterns; or the wall is cut in geometric patterns in relief over its surface; occasionally hangings of silk or tapestry hung over the wall, forming a background to the altar decorations. Also the screen in front of the choir, on which the rood was displayed, and the wall or screen at the back of a seat. An open hearth, upon which fires were lighted immediately under the louvre.

Resaca, a village in Gordon co., Ga., 85 miles N. W. of Atlanta. Here on May 15, 1864, the Confederate army under Johnston was attacked and defeated by the Union army under Sherman. The loss was heavy on both sides.

Resaca de la Palma, a ravine in Cameron co., Tex., where on May 9, 1846, the United States troops under Taylor defeated the Mexicans under General Arista, and opened the way to Matamoros.

Rescripts, answers of the Popes and emperors to questions in jurisprudence officially propounded to them. *Rescripta principis* (rescripts of the prince) were one of the authoritative sources of the civil law, and consisted of the answers of the emperor to those who consulted him, either as public functionaries or as individuals, on questions of law. They were often applied for by private persons, more especially women and

Reservation

soldiers, to solve their doubts or grant them privileges. The rescripts directed to corporate and municipal bodies were known as *pragmaticæ sanctiones*, a name which has found its way into the public law of Europe. Rescripts might gradually come to have the force of law, in so far as their determinations in particular cases were of general application.

Rescue, in law, is the forcibly and knowingly freeing another from an arrest or imprisonment; and it is generally the same offense in the stranger so rescuing, as it would have been in a jailer to have voluntarily permitted an escape.

Resection, in surgery, the operation of cutting out the diseased parts of a bone at a joint. It frequently obviates the necessity of amputating the whole limb, and, by the removal of the dead parts, leaves the patient a limb which, though shortened, is in the majority of cases better than an artificial one. Resection, which is one of the triumphs of modern surgery, was performed as early as 1762. In 1830-1850 there were no recorded operations of this kind, but since 1850 the practice has revived and is now frequent, many limbs being saved by its use.

Reseda, the mignonnette; the typical genus of *Resedaceæ*; flowers in racemes; calyx irregular, mostly laciniated; stamens 10 to 40; ovary sessile or stalked, one-celled, opening at the top; stigmas three to four. From Europe and Western Asia; known species, 26. One species, *R. phyteuma*, is eaten as a kitchen plant in Greece. *R. odorata* is the mignonnette. *R. luteola* yields a yellow dye.

Resedaceæ, weldworts, or resedads; an order of hypogynous exogens, alliance Cistales; herbs, rarely small shrubs, with alternate leaves and minute gland-like stipules; flowers in racemes or spikes; calyx many-parted; petals broad, fleshy plates with lacerated appendages at the back, unequal; stamens definite; ovary three-lobed, one-celled, many-seeded, usually with three to six parietal placentæ; stigmas three, glandular, sessile; fruit dry and membranous, or succulent; seeds several, reniform. They are closely akin to *Capparidaceæ*; mostly from the N. temperate part of the Eastern Hemisphere, but a few species are from the Cape of Good Hope and California. Known genera six; species variously estimated from 20 to 42.

Reservation, in the United States, a tract of the public land reserved for some special use, such as Indian tribes, national parks, notable battlefields, large military cemeteries, etc.

Reservation, Mental, the act of reserving or holding back some word or clause which is necessary to convey fully the mean-

ing really intended by the speaker. It differs from equivocation in this, that in the latter the words employed, though doubtful, and perhaps not fitted naturally to convey the real meaning of the speaker, are yet, absolutely speaking, and without the addition of any further word or clause, susceptible of that meaning. Few questions in casuistry have excited more controversy, or have been the subject of fiercer recrimination, than that of the lawfulness of equivocation, and mental reservation. In the celebrated "Letters" of Pascal against the Jesuits it was one of the most prominent and, used as he employed it, the most effective topics; and Pascal's charges against the Jesuit casuistry of that day have been repeated in almost every popular controversy on the subject which has since arisen. There are several varieties of mental reservation, differing from each other, and all differing from equivocation. But as regards the morality of the subject all the forms of language calculated to deceive may be classed together. Mental reservation is of two kinds, purely mental and not purely mental. By the former designation is meant a mental reservation which cannot be detected, whether in the words themselves, or in the circumstances in which they are spoken. Of this kind would be the mental reservation implied if a person, on being asked if he had seen A. B. (whom he really had just seen walking by), were to reply: "I have not seen him," meaning "riding on horseback." A "not purely mental" reservation is that which, though not naturally implied or contained in the words, may nevertheless be inferred or suspected, either from them or the circumstances in which they are used. Of this kind would be the mental reservation of a servant, in giving the ordinary answer to a visitor's inquiry for his master: "Not at home," though his master were really in the house; or that of a confessor, who, in a country where the privileges of the secret of the confessional are known and admitted, on being asked whether a certain person had committed a crime, which the confessor knew from his confession that he had committed, should answer: "I do not know," meaning "outside of the confessional." And, in general, all such doubtful forms, whether of mental reservation or of equivocation, may be divided into discoverable and undiscoverable. Much of the odium which has been excited against the casuists for their teaching on this head has arisen from the confusion of their views as to these two classes of mental reservation.

According to the most approved Roman Catholic authorities, "purely mental" reservations and "absolutely undiscoverable" equivocations are held to be in all cases unlawful, such forms of speech being

in truth lies, inasmuch as they have but one real sense, which is not the sense intended by the person who uses them, and hence can only serve to deceive. This doctrine is held by all sound Roman Catholic casuists, and the contradictory doctrine is expressly condemned by Pope Innocent XI. On the contrary, mental reservations "not purely mental" and "discoverable" equivocations are held to be not inconsistent with truth, and in certain circumstances, when there is necessity or weighty reason for resorting to them, allowable. An historical example of such equivocation or reservation is in the well-known answer of St. Athanasius to the question of the party who were in pursuit of him, and who, overtaking him, but not knowing his person, asked what way Athanasius had gone. "He is not far off," replied Athanasius, and the party passed on in pursuit. And an ordinary example of discoverable mental reservation is that of a person who, on being asked by one to whom he could not with safety give a refusal, whether he has any money, should reply: "No," meaning, "none to lend to you." In order, however, to justify the use of these devices of speech, casuists require that there shall be some grave and urgent reason on the speaker's part; as, for example, the necessity of keeping a state secret, or a secret of the confessional, or of a professional character, or even the confidence intrusted by a friend, or the ordinary and fitting privacy which is required for the comfort and security of domestic life and of the peaceful intercourse of society; and that the concealed sense of the form of speech employed, though it may be actually undiscovered, and even unlikely to be discovered, may yet be, in all the circumstances, really discoverable. Some Protestant moralists admit that in some cases even equivocation is permissible; if any such reservations are allowed it is obvious there must be great difficulty in drawing a line between reservations that are permissible and those that are not.

Reservation of the Eucharist, the practice in the Roman and Greek Communion of reserving the Eucharist for the sick. Among the Latins it is also reserved for Exposition and the adoration of the people, and for Benediction. The reserved Eucharist is kept in a tabernacle, usually on the high altar, but in some churches in a side chapel. The Greeks reserve the Eucharist in a place behind the altar, called *artophorion*. In both communions a light is kept burning before the place in which the Eucharist is reserved.

Reservation, Papal, the privilege, introduced by John XXII. and continued by Clement VI. and Gregory XI., of reserving to the Holy See the power of electing bishops, formerly possessed by the clergy and

Reserve

people of the several cities. Reservations were abolished by the Council of Constance, March 25, 1436.

Reserve, in military usage, a body of troops kept for any emergency; that portion of an army drawn up for battle which is reserved to support the other lines as occasion requires. In Europe the term includes those soldiers who, after having enlisted for a certain period of service, have been a certain time in the army, and then have been passed into the reserve, in which they are at any time liable to be recalled to service till their full period of enlistment has expired. (See ARMY.) A magazine of warlike stores situated between an army and its base of operations.

Reserve, Western. See WESTERN RESERVE.

Reserved Cases, in Roman theology, certain sins, the power to absolve from which is reserved to some ecclesiastical superior, as the ordinary of a diocese, a prelate of a religious order, or the Pope, so that ordinary confessors cannot deal with them. In English and American dioceses reserved cases are of extremely rare occurrence.

Reserve Forces, those troops which, by the terms of their engagement with the State, compulsory or otherwise, are liable to be at once recalled to the field army in case of war. In the United States the National Guard is subject to call for immediate duty. In Germany the men serve three years in the active army and four in the reserve; in France, four years in the army reserve and five years in the territorial or home service reserve. In England the reserves are composed of the army reserve, that is, of men enlisted for 12 years, who have only passed a portion of that time with the colors, and of the militia reserve who have agreed for an extra retaining fee to serve in the army, at home or abroad, if called out for duty.

Reservoir, an artificial basin in which a large quantity of water is stored. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting a large supply of rainfall with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earth work, but the latter is the more usual, as it is generally the more economical method. Reservoirs in which the dams are built of earthwork must be provided with a waste weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering

Reservoir

the works. The outlet at the bottom, by which the water to be used is drawn off from the reservoir, may consist either of a tunnel, culvert, or iron pipes provided with suitable sluices. A vast system of reservoirs, called "tanks," exists in India, constructed for purposes of irrigation. The reservoirs on the irrigation canals of Spain are all of masonry; they are circular or polygonal in shape, and the interior face of the wall, which is constructed of large ashlars, is vertical. In France, Italy, and particularly in England, the preference is given to earthen dams. Sometimes natural lakes are used as reservoirs, instances of which are Loch Katrine for the water supply of Glasgow, and Thirlmere for that of Manchester. In these cases means are adopted for raising or lowering the surface of the water, the difference between the lowest and the highest level of the surface, multiplied by the area of the lake, giving the measure of its available storage. Distributing reservoirs for towns are generally built of masonry, but are sometimes of cast iron or boiler plate. They are placed high enough to command the highest part of the town, and are capacious enough to contain at least half a day's supply, their chief use being to store the surplus water during the night. Several catastrophes have occurred from the bursting of imperfectly formed reservoirs. The bursting of the Dale Dyke reservoir at Sheffield, England, in March, 1864, resulted in the loss of 300 lives and the destruction of an immense amount of property.

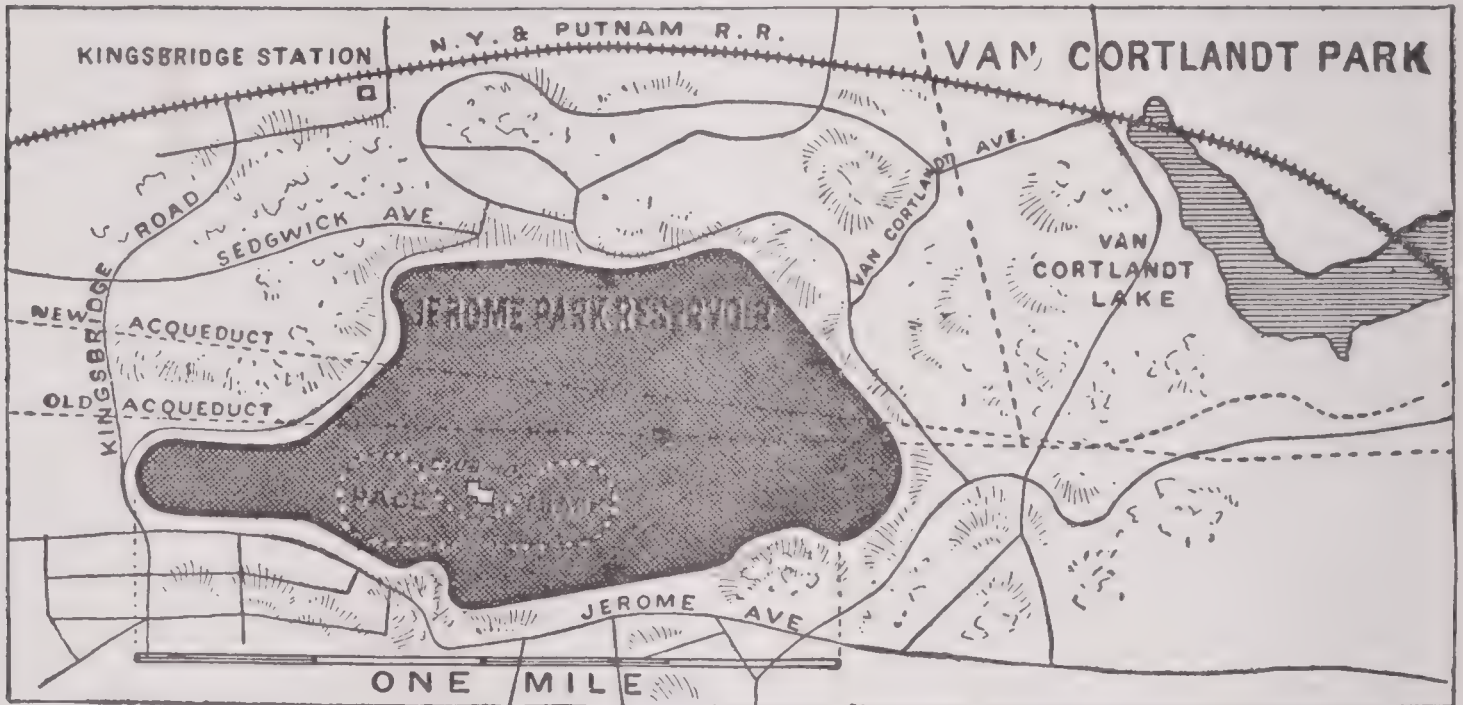
Reservoir, Jerome Park. It is now nearly 70 years since the authorities began the serious study of the problem of New York city's water supply, which resulted in the construction of the Croton reservoir, some 40 miles N. of the city. The scheme as ultimately developed included this reservoir and an aqueduct now known as the "Old Aqueduct," which extended from the reservoir to New York, and had a capacity when running entirely full of 90,000,000 gallons in 24 hours. In 1890 the new aqueduct with a capacity of 300,000,000 gallons per day was completed. This structure was built as far as possible in tunnel, and was carried in a practically straight line from Croton reservoir to the Harlem river. Both aqueducts discharge directly into a terminal gatehouse at 135th street, from which the water is led by 48-inch pipes into the city mains, and into the Central Park reservoirs, which latter have a capacity of 1,000,000,000 gallons of water, or sufficient for something over four days' supply for the city. As a result of the comparatively low level of these reservoirs, the high-water level being only 115 feet above the sea, the pressure fails before they are empty, and the remaining water ceases to be available

Reservoir

on the higher floors of the city buildings. On this account the actual supply available in the Central Park reservoirs is only sufficient for about three and a half days, and were there to be any failure of the Croton reservoir, or in the connecting aqueducts, the city would be confronted with a water famine. It was for these reasons that the Aqueduct Commissioners determined five years ago to construct an additional reservoir at the city end of the line, to have about double the capacity of those in Central Park.

Reservoir

the paving being carried up to about $2\frac{1}{2}$ feet above high-water line. The embankment is 20 feet wide at the top, and to assist in rendering it perfectly impervious to water, a vertical wall of first-class masonry has been built in the center of the embankment, starting from bed rock and rising to a level somewhat above the high-water line. As is explained later in this article this form of embankment has been modified wherever the nature of the subsoil demanded a heavy retaining wall on the inner face.



MAP OF JEROME PARK RESERVOIR AND VICINITY.

The Jerome Park reservoir, as the new storage basin is called, is located on a lofty ridge, which runs N. and S. between the valleys in which are located the New York and Putnam and the Harlem railroads. It takes its name from the famous race-course, which is indicated in the accompanying map of the locality, by the white dotted line within the area of the reservoir. The site is admirably adapted by nature for the excavation of a large artificial basin; for at this point there is a general depression in the summit of the ridge, and the labor of excavating and embanking the reservoir has been proportionately lessened. The greatest length of the reservoir in a N. and S. direction is a little over one mile, and its greatest width half a mile, its area being 229 acres. The whole of the bottom is being excavated to a uniform depth of $26\frac{1}{2}$ feet. Such is the configuration of the ground that for about half a mile of the perimeter of the lake the waters will be held in by the natural ground, and the other half will be contained by an artificial embankment, built of earth put down in 6-inch layers and well rolled and tamped. The outer face which has a slope of 2 to 1, will be sodded, and the inner face with a similar slope will be covered with 6 inches of concrete and a paving of granite blocks,

Though the total amount of excavation is greatly lessened by the natural depression of the ground, there is no point where it is carried less than 16 feet below the natural surface, the bottom of the finished reservoir being everywhere $31\frac{1}{2}$ feet below the top of the embankment. Add to this the fact that there are many parts of the site, such as the rising ground upon which the old Jerome Park Club House stood, which were considerably higher than the present top of the embankment, and it will be understood that the total yardage to be excavated reaches a very high figure. As a matter of fact the total estimated excavation at the commencement of the works was 6,500,000 cubic yards, of which at least one-half is solid rock; and since excavated rock occupies about double the space that it does in the solid mass and subsequent changes have raised this total by 300,000 cubic yards, the contractors by the time they have completed their work will have to dispose of about 10,000,000 cubic yards of material. At the present writing an estimated total excavation of 3,933,000 cubic yards has been taken out, loaded on cars and carried, most of it, toward Long Island Sound, where it is being used in filling in swampy ground and depressions in Bronx and Pelham Parks. The excavation is be-

Reservoir

ing carried on with powerful steam dredges and diggers; and during the past three years the interior of the basin has been covered with a network of tracks. As the work was carried down to grade, the tracks were removed, and at present they are concentrated against the W. wall of rock. They lead to a main line, which passes out of the reservoir, crosses the Harlem railroad tracks by means of a bridge, and runs down to the tide lands of Long Island Sound.

Both the old and the new aqueducts pass through the site of the Jerome Park reservoir on their way to the city, their position being indicated by the dotted lines in the accompanying map. The old aqueduct was at ground level, and the new aqueduct some 100 feet below the surface. The bottom of the reservoir is below the old aqueduct foundation, hence it was necessary to remove the latter altogether, and build an entirely new structure, in which has been incorporated a branch aqueduct from the new aqueduct. At a point about a mile to the N. of the reservoir the new aqueduct is at ground level. Here it begins to descend, and is carried in a tunnel at a depth of about 100 feet below the reservoir.

At the center of the reservoir a vertical shaft rises from the aqueduct to the reservoir bottom. A gatehouse has been put in the new aqueduct where the tunnel commences and a surface branch of it has been built, which runs parallel with the old aqueduct till the N. entrance of the reservoir is reached. Here the branch and the old aqueduct are embodied in one compact masonry structure, which is built up from the solid rock of the reservoir bottom, and extends from N. E. to S. W., dividing the reservoir into two separate basins. Opposite the point where the shaft which rises from the aqueduct tunnel pierces the reservoir, there is a large main gatehouse which connects with the shaft by a short conduit. To the S. of the gatehouse the new aqueduct is carried through the reservoir as a double-barrel conduit, each conduit being 11 feet in diameter, and the old aqueduct is carried above these at its former elevation, as shown in the accompanying figure. Fifteen hundred feet S. of the gatehouse one of these conduits leads into the W., and the other into the E. basin of the reservoir.

Radiating from the main central gatehouse are six lines of 48-inch pipe, two of which leave the reservoir to the N. W., two to the W., and two to the S. E., one of these leading to a high service pumping station. At each of these three points of exit is a gatehouse, and the main gatehouse connections are so arranged that these pipes may be supplied with water from either basin of the reservoir, or di-

Residence

rectly from either the old or the new aqueduct.

The plans for this gatehouse, which is one of the most important pieces of work in the whole scheme, have been revised by the present chief engineer of the Aqueduct Commission, William R. Hill. The present design is so arranged as to secure a maximum number of combinations and by-passes for the proper control of the water. The mass of masonry is approximately circular in plan and contains within it 22 separate gates. Broadly speaking, it may be said that the new aqueduct is conveyed directly through the N. E. and S. W. axis of the main gatehouse, while the old aqueduct is conducted in a broad curve around its W. circumference. The total amount of excavation has been raised by certain changes in the direction of the embankment along the N. W. side of the reservoir, where for a length of 2,300 feet the central core wall has been dispensed with and a massive retaining wall carried from the high-water level down to bed rock has been substituted on the inner face of the embankment. This was necessitated by the exceedingly poor nature of the sub-soil at this place, which was found to approximate a shifting quicksand in constituency. The extra excavation necessitated by this form of wall has provided a larger water space within the reservoir, and it has been found that the saving in concrete and paving secured by dispensing with the inner sloping of the embankment at this point and the value of the increased storage for water more than offsets the extra cost of the heavy retaining wall.

The present estimate for the total excavation is 6,900,000 cubic yards of material, of which 3,900,000 is earth and 3,000,000 is solid rock. Of this total 2,286,000 cubic yards of earth have been taken out and 1,647,000 yards of rock, so that something less than two-thirds of the work has been completed. The capacity of the E. basin is 1,085,000,000 gallons, and the capacity of the W. basin 765,000,000, making a total of 1,850,000,000 gallons. The excavation of the W. side of the reservoir was completed in 1901, and in the spring of 1902 the process of concreting and finishing was under way. The total cost of the finished work will be \$5,840,000.

Residence. The length of time which a person shall remain within the limits of a State in order to give him a legal residence there, varies in the different commonwealths, each government being the judge of the qualifications necessary to entitle a denizen to claim permanent residence within its boundaries. An alien who desires to become a naturalized citizen of the United States must prove a residence of five years in the country previous to admittance to the rights of adoption.

Residuary Legatee

Residuary Legatee, the legatee to whom is bequeathed the residue of goods and personal estate after deducting all the debts and specific legacies.

Resin, or Rosin, a widely distributed class of vegetable substances, characterized by being insoluble in water, soluble to different degrees in alcohol, ether, and liquid hydrocarbons, softening or melting at a moderate heat, and at a higher temperature burning with a smoky, luminous flame. In the crude condition they form amorphous masses, having a conchoidal fracture, and are either neutral or acid. They may be divided into three classes: (1) Exuding spontaneously from plants, or from incisions in the stems and branches, as benzoin. (2) Oxidized fossil resin, occurring in beds of coal, lignite, etc., as amber, coloretin, etc. (3) Resins extracted from plants by alcohol, as the resins of angelica root, etc. Some are employed in medicine, others in the preparation of varnishes, sealing wax, and similar substances. Resin of carana is from *Bursera acuminata*; resin of coumia from *Icica ambrosiaca*; resin of guaiacum from *Guaiacum officinale*; resin of hemp, a resin which exudes from hemp in India, but not in Europe.

Resist, in dyeing, a material applied to cotton cloth to prevent the action of a mordant or color on those portions to which it is applied in the form of a pattern.

Resistance, in electricity, the opposition offered by any conductor to the passage of an electric current. For unit of resistance, see OHM. In physics, a power by which motion or a tendency to motion in any body is impeded. If a weight be placed upon a beam which bears it up, the force which does so is the resistance opposed to its further descent. The resistance of the water, which is of greater specific gravity than a cork, causes the latter to keep the surface instead of sinking to bottom. The resistance of the air impedes the movement of a projectile. In mechanics: Solid of least resistance, solid of such a form as to experience, in moving in a fluid, less resistance than any other solid, having the same base, length, and volume; or, on the other hand, being stationary, to offer the least interruption to the progress of that fluid. In the former case it is the best form for the stem of a ship; in the latter, for the pier of a bridge.

Res Judicata, in law, a term meaning that the subject matter of an action has been already decided by a court of competent jurisdiction. A matter so decided cannot again be made a ground of action between the same parties.

Resolution, in law, a solemn judgment or decision. In mathematics, the operation of separating any expression into factors;

Resonator

that is, the operation of finding two or more expressions such that their product is equal to the given expression. Resolution of an equation: The same as reduction of an equation. In medicine, the passing away, without suppuration, of a tumor or of inflammation. In music, the process of relieving dissonance by succeeding consonance.

Resolution of forces or of motion: In mechanics, the dividing of any single force or motion into two or more others, which, acting in different directions, shall produce the same effect as the given motion or force. Since an infinite number of parallelograms can be drawn, having a given line for their diagonal, any force can be resolved into two others in an infinite number of ways. Similarly, if three forces act on a point, and their resultant be required, find the resultant of any two of them; the composition of this resultant with the third force will give the resultant of the three given forces. In like manner, the resultant of any number of forces acting on a point may be found.

Resolution of a nebula: In astronomy, the demonstration by means of a very powerful telescope, that the diffused light of a nebula is really that of a multitude of exceedingly distant stars.

Resolutioner, in Scotch Church history, when the Scotch, having induced Charles II. to take the Covenant, and crowned him king, had been severely defeated at Dunbar by Oliver Cromwell (Sept. 3, 1650), their Parliament abolished a certain Act of Classes which prevented many royalists entering the army. The larger section of the Scotch Church approved of the step on account of the emergency, a smaller but zealous party disapproved; the former were called Resolutioners, the latter Protesters. Cromwell supported the latter. The sufferings through which both passed after the restoration in 1660 again fused them into one.

Resonance, or Resonancy, in acoustics, (1) Sound reflected by a surface less than 112.5 feet from the spot whence it originally traveled. The direct and the reflected sounds are confounded, but the one strengthens the other. Bare walls tend to be resonant; walls hung with tapestry are not so. (2) The increase of sound produced by a sounding board, or by the body of a musical instrument. In medicine, a more or less shrill sound heard by auscultation in the larynx or lungs of a person speaking, or of one affected with chest disease.

Resonator, an instrument invented by Professor Helmholtz for facilitating the analysis of compound sounds. It consists, in its simplest form, of a tapering tube or a hollow bulb, spherical or nearly so in form, having an opening at one side for the air, and a tube adapted to the ear at the

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other. When the instrument is fitted to one ear, the other being stopped, tones above or below the pitch of the resonator will be but imperfectly heard; but if a note be sounded correspondingly to its pitch the note will be intensified.

Resorcin, a colorless crystalline compound prepared on a large scale by the action of sulphuric acid on benzene, and by the treatment of the resulting compound with caustic soda. It yields a fine purple-red coloring matter and several other dyes used in dyeing and calico printing, is a powerful disinfectant and deodorizer, and is used as a medical drug.

Respiration, a part of the life of all organisms, animal and vegetable. It is a series of chemical changes, the first of which is the absorption of oxygen into the body, and the last of which is the excretion of carbonic acid. The association of this intake of oxygen and excretion of carbonic acid with the same organs, the lungs, is due to the fact that both the food stuff and the waste stuff are gases, and not to any immediate connection between them. Necessarily any organ adapted to the diffusion of a gas from the air into the blood must also be adapted for the diffusion of a gas from the blood into the air; that is, supposing that the living membrane, of which the lung essentially consists, which separates the air from the blood, acts, so far as the diffusion of gases is concerned, as a dead membrane; even if it has any effect arising from the fact of its being a living membrane it is probable that it will behave in a similar way to both the ingoing and outgoing gases. The respiration of plants comes under the head of vegetable physiology, and the general relation of the function of respiration to the other bodily functions, under physiology.

In all animals in which the parts of the body are nourished by the circulation of a stream of food material, the blood, there must always be two distinct sets of processes to consider: (1) the maintenance of the blood in a normal state, by the supply of fresh food matter from time to time, and by the elimination of waste matter; (2) the nutrition of the individual tissues and cells of the body by the blood stream. Applying this to the function of respiration, we shall have to consider (1) the manner in which oxygen is supplied to the blood and carbonic acid gas removed from it; (2) the manner in which the cells are able to take oxygen out of the blood and cast into it their useless carbonic acid; also the changes that take place within the cells between the intake of the oxygen and the output of the carbonic acid. These two sets of processes are usually described as the outer and the inner, or tissue, respiration. Some writers include in the term outer respiration the

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absorption of oxygen by the cells from the blood, and the excretion of carbonic acid into the blood, and restrict the term inner respiration to the actual changes that take place within the cells. It is evident that outer respiration corresponds to the processes of digestion and absorption to which food materials other than gaseous are subjected. It must be evident, too, that the mass of our present information refers to outer respiration; the changes that take place within the cells, of which inner respiration is a part, are the whole mystery of the objective side of life.

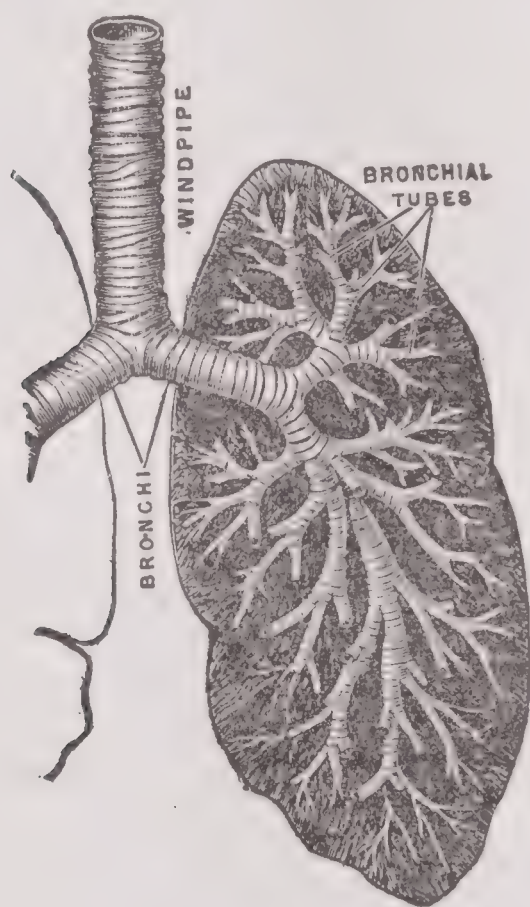
Outer Respiration.—In all animals which possess a blood stream the outer respiration is carried on by the simple diffusion of oxygen into and of carbonic acid out of the blood through a thin membrane from and into the air or water in which the creature lives. As already noted, it is possible that the fact of this membrane being a living one may in some ways modify the otherwise simple processes of diffusion. The essential structure, therefore, of all breathing organs, lungs, gills, or tracheæ, must be the same: a thin membrane exposed on the one side to the oxygen-containing medium, air or water, in which the animal lives, on the other side to the blood flowing in a network of thin-walled vessels, so that the gases that have to pass in and out of the blood are only separated from the air or water from which and into which they have to pass by thin partitions—by the membranous wall of the breathing organ, and by the thin wall of the blood vessels. Animals such as the frog, which have thin skins, can breathe with—*i. e.* the gases can diffuse through—the whole surface of their bodies if the under skin is well supplied with blood-vessels. A frog for this reason can live for days without its lungs, but if its skin be rendered impervious to gases will die very quickly, even with the lungs intact. But, as all the mammalia have thick skins, this method of breathing must be reduced to a minimum, if indeed it exists at all.

In outer respiration we have two things to consider: (1) The manner in which fresh supplies of oxygen are pumped into the lungs, while the poisonous carbonic acid gas is pumped out. This may be called the mechanics of respiration. (2) The manner in which oxygen passes from the air in the lungs into the blood, and is held in the blood, and the manner in which the carbonic acid in the blood passes out of the blood into the air-chambers of the lungs. This may be called the chemistry of respiration.

Structure of Respiratory Mechanism.—This mechanism consists of the lungs, a series of minute air chambers with a network of capillaries in the wall, the air

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passages from the air chambers of the lungs to the outer air, and the chest walls with their muscles, which act like bellows and change the air in the lungs. The essentials of structure that a lung must possess have already been emphasized. The simplest lung that we can imagine would be an elastic membranous bag, well supplied with blood vessels, and with a pipe connecting it with the air; the most complicated that exist are essentially of that construction, the complications that occur having for their object merely the enlarging of the surface exposed to the air. Let us begin with the air passages. There are first the nose and mouth; these join the upper part of the gullet, known as the pharynx. From the



THE TRACHEA (WINDPIPE), BRONCHI, AND ONE OF THE LUNGS IN SECTION.

pharynx arises the windpipe (trachea); this passes through the voice box (larynx) into the chest cavity; there it divides into two passages (the bronchi); the bronchi go on dividing again and again, generally into two; the ultimate divisions (the bronchioles) open into clusters of air chambers. The air chambers are about $\frac{1}{100}$ inch in diameter. It has been estimated that there are some 725,000,000 of them, and that their total surface is about 2,000 square feet. The walls of the air chambers are formed of a thin membrane in which the blood and lymph capillaries ramify. Minute openings lead from the air chambers into the lymph spaces of the membrane. The membranous walls are partly formed of elastic tissue. It is this that gives to the lungs their elasticity. The larger air pas-

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sages (trachea and bronchi) are kept open by horseshoe-shaped plates of cartilage; muscles stretch between the poles of the horseshoe, complete the ring, and permit the size of the passages to vary, at the same time resisting over-distension when the internal pressure rises. These larger air passages are lined by a mucous membrane, containing mucous glands; the innermost layer is a ciliated epithelium; the cilia lash upward, and thus keep the passages free from mucus and remove foreign particles. As the passages become smaller they lose their cartilages, and the muscles form a continuous circular layer. The lungs are invested by a membrane (the visceral pleura). At the root of the lungs this membrane is continuous with a membrane which lines the chest cavity (the parietal pleura). The space between the two is the pleural cavity; it is in reality a large lymph space, and communicates with the lymphatics of the pleura. Owing to the air pressure within the lungs the two pleuræ are closely pressed together, the lungs entirely filling the chest cavity. If the chest wall be punctured the lungs partially collapse owing to their elasticity, and the respiratory movements are unable to move the air in the lungs.

The chest is an air-tight chamber enclosing the lungs and the heart. The walls of the chest are formed of bones (the ribs, sternum, and backbone) and muscles; the bones and muscles are so arranged that the size of the chest cavity can be altered. In this way the chest acts as a bellows and moves air in and out of the lungs. The ribs are sloped slightly downward, especially after an expiration; when an inspiration is taken certain muscles fix the upper ribs, and those muscles connecting the ribs to each other contract and the ribs are raised, and thus the size of the chest cavity is increased. At the same time a flat muscle called the DIAPHRAGM (*q. v.*), which separates the chest cavity from the rest of the body cavity, and which after an expiration is arched upward (by the pressure of the abdominal viscera on it, the viscera in turn being pressed on by the abdominal walls), forcibly contracts, becomes flatter, and therefore enlarges the size of the chest cavity, forcing the abdominal viscera downward and causing the abdomen to protrude. In these two ways, then, the size of the chest cavity may be increased. The result of this enlargement is that the pressure of the air within the cavities of the lungs is lowered; air therefore from without rushes through the nostrils (one ought not to breathe through one's mouth) down the windpipe into the lungs, and thus a fresh supply of oxygen is introduced. The movements which produce this result are known as the inspiratory movements. In making

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an expiration the reverse effects are produced; the chest cavity is made smaller, the pressure of the air in the lungs increases, and some rushes out through the nostrils into the air till the pressures inside and outside are equalized. An ordinary expiration is effected by the elasticity of the lungs, by the fall of the ribs, unsupported by the contraction of the muscles that caused an inspiratory movement, by the elasticity of the cartilages of the ribs which were twisted during inspiration, and by the elasticity of the abdominal wall which was forced outward by those viscera pushed downward by the diaphragm. An ordinary inspiration is therefore the result of a number of active muscular contractions, while an ordinary expiration is the result of mere passive elasticity of the parts concerned. There are certain other respiratory movements to be considered. During inspiration and expiration the glottis (the opening between the vocal chords of the larynx) undergoes a rhythmical widening and narrowing; this movement is greater in forced than in quiet breathing. And during inspiration the nostrils dilate; in most cases perhaps the inspiration has to be rather a forced one before they do so. Forced respiration occurs when the supply of oxygen is insufficient, or when carbonic acid accumulates in the blood. Any muscle that can aid in enlarging and decreasing the size of the chest cavity is called into play. The average amount of air, in the case of an individual five feet eight inches in height, that goes in and out of the lungs at each inspiration and expiration is about 20 cubic inches; this is called the tidal air. By means of forced inspiratory movements the ingoing tide may be increased by 120 cubic inches; by means of a forced expiration the outgoing tidal air may be increased by 90 cubic inches. After the most forced expiration possible there always remain within the lungs about 90 cubic inches of air. So that if we take as deep a breath as possible, and then make as forced an expiration as we can, we shall drive out $120 + 20 + 90 = 230$ cubic inches of air. This is termed the respiratory capacity. Since the tidal air is only 20 cubic inches, and 180 cubic inches remain in the chest after an ordinary expiration, it follows the air directly changed during respiration is not that really within the lungs themselves, but is that within the nose, windpipe, and larger bronchi, the pipes that result from the branching of the windpipe. Therefore the changes of the air within the essential parts of the lungs are the result of diffusion between it and the purer air of the bronchi, aided by the rush with which the tidal air flows in.

The ordinary respiratory movements differ in the two sexes and at different periods of life. In young children the chest is altered

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in size chiefly by the movements of the diaphragm, and the protrusion of the abdominal wall during inspiration is therefore very marked. In men also it is the diaphragm which is chiefly operative, but the ribs are also moved. In women it is the movement of the ribs, especially the upper ones, which is the most extensive. The respiratory rhythm is the relation of the acts of inspiration and expiration to each other as regards time. It may be expressed as follows: In.= 3, Ex.= 4, pause = 3. The number of respirations in a healthy person is about 14 or 18 per minute; it is greater (nearly double) in childhood. It varies according to circumstances, exercise, rest, health, disease, etc.; in disease it may fall as low as seven or rise to 100.

The proportion of respiratory movements to heart-beats is about one to four, or one to five; in health they vary together. Since the heart and the lungs are contained in the same air-tight cavity, it follows that the variations in size of the heart as it beats must rhythmically affect the pressure of the air in the lungs, causing a succession of minute puffs of air to leave and enter the nostrils. Similarly the alterations in pressure within the chest cavity affect the heart. Increase of pressure or expiration must (owing to the arrangement of the valves) help the blood to flow out of the heart. Decrease of pressure or inspiration must, for the same reason, help the flow of blood into the heart. The pressure which the expiratory muscles, aided by the elasticity of the parts concerned, can exert is on the average equal to that of four inches of mercury. The inspiratory muscles can lower the pressure within the chest cavity by a pressure equal to that of about three inches of mercury below that of the atmosphere; the greater part of the energy of the inspiratory movements is used in overcoming the elasticity of the lungs, chest walls, and abdominal walls. The respiratory sounds are two in number: (1) the tubular sound, heard over the windpipe and the larger bronchi, probably due to friction of air in these passages; (2) the vesicular sound, heard over the whole chest during inspiration, probably caused by the sudden dilation of the small air chambers of the lungs, and to friction in the smaller passages. During a quiet expiration there may be no sound; when present it is very soft and indistinct, probably due to the air passing out of the air chambers.

Nervous Mechanism of the Respiratory Movements.—Though all the muscles concerned in the movements of breathing are voluntary muscles—*i. e.*, can be made to contract by an act of will—yet respiration is normally an entirely involuntary act. This is obvious from the fact that during

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sleep, or during absence of consciousness caused in any way, respiration goes on as well as during wakefulness. Further, though we may at will breathe or cease to breathe, yet we cannot by any effort of the will suspend the respiratory movements for longer than at most a few minutes at a time. We have seen how many are the muscular movements involved in breathing, and it is obvious that the adjustment as to time and intensity of contraction of all these muscles must be a very nice one—in technical phrase, they must be coördinated. Such coördination must always be the result of a nervous mechanism, and this coördination, together with the fact of the rhythmical nature of the respiratory movements, suggests that the whole must be under the dominance of a nervous center. The position of this center has been ascertained by experiment; the whole of the upper part of the brain may be removed, and yet breathing will be unimpaired; but if a certain part of the medulla be injured or removed then all respiratory movements cease at once; the center must therefore be in that part of the medulla. The center is bilateral, for destruction of one-half of the medulla is followed by paralysis of the respiratory muscles of that side only. Further, we must conclude that, since inspiration is in its muscular movements antagonistic to expiration, there is an inspiratory center and an expiratory center in each of the two halves of the respiratory center; but, as already noted, the expiratory center is active only in forced respiration. The similar centers on each side are so coördinated that they act as one center. This compound center then is to be regarded as regulating the respiratory movements. We have said that if the medulla be injured the respiratory movements cease at once, and that from this it is concluded that the respiratory center is in the medulla; but in young animals it seems that the movements may continue after destruction of the medulla, or may be produced by the reflex stimulation of some center by irritating the skin. This subsidiary center must be in the spinal cord; but it almost certainly is a subsidiary center, though the matter is not quite settled yet.

Now is the center “automatic” in its discharges of nervous impulses, or is it reflexly stimulated into action by the arrival of stimuli from some other part of the body? We know by ordinary experience that the center may be influenced from without, by impulses arising from higher parts of the brain, as when by will we alter the respiratory rhythm, or when it is affected by emotions, and also by impulses arising from the stimulation of sensory surfaces, as when cold water is dashed against the skin. It is found by experiment that the

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center may be influenced in two distinct ways: (1) by nervous impulses; (2) by changes in the blood.

Nervous impulses may affect either the inspiratory or the expiratory part of the center. It seems that all afferent nerves—*i. e.*, nerves in which the impulses travel toward and not away from the central nervous system—may influence the respiratory center. But the vagi (nerves that are distributed to all the viscera) seem to be in specially close relation, beginning as they do close to the respiratory center in the medulla, and ending in the lungs. If one vagus be cut there is not much effect upon the breathing; but if both are cut then the breathing becomes slower and deeper. If the end nearest the center of one of them be stimulated the respiratory rhythm is generally quickened; by a certain strength of stimulus it may be made normal; if the strength of the stimulus be further increased the inspiratory movements may be made before expiration is finished; this effect increased to a certain extent must obviously result in a stand-still of all respiratory movements; the chest walls remain in the inspiratory place. But occasionally it happens that stimulation of the central end of a vagus, after both have been cut, produces a further slowing of the movements—they may indeed be entirely stopped; in this case the chest walls remain in the expiratory phase. From these results it is concluded that the vagus contains two kinds of fibers that affect the respiratory center, one kind that increases the respiratory movements, another that inhibits them; and, further, that when one kind is active in causing increased inspiratory movements the other kind is active in causing depressed expiratory movements. Further, if air be drawn out of the lungs, thus imitating expiration, an inspiratory effort is made; if air be forced into the lungs, thus imitating an inspiratory movement, an expiratory effort is made. Therefore we may conclude that expiration stimulates the inspiratory center, and that inspiration stimulates the expiratory center. That the effects from which these conclusions are drawn are due to the stimulation of the vagus endings in the lungs is shown by the fact that they do not occur when the vagi have been divided; and that they are not due to alteration in the state of the essential gases of the blood is shown by the fact that they may be produced by forcing an indifferent gas, such as nitrogen, in and out of the lungs. The respiratory pump is therefore a self-regulating mechanism.

If we cut the vagi the respiratory rhythm usually becomes slower, and the movements are deeper; therefore normally stimuli are constantly passing up the vagi to the center, and accelerating the discharge of im-

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pulses by the center. Still, an accelerating effect is not the same as an initiating stimulus. Further, since respiration goes on when the higher parts of the brain are removed, impulses proceeding from above are not essential; and since when the spinal cord is cut below the medulla the movements of the nostrils and vocal cords continue (though of course all others cease), the center works independently of sensory impulses arriving from any nerve, except the cranial nerves; and since these cranial nerves may be divided, if the medulla and spinal cord be left intact, without any effect on the respiratory movements, we may conclude that the center is automatic in its action, but may be influenced from without.

The more venous the blood the greater is the activity of the center; when the blood reaches a certain state of impurity convulsions arise. We may conclude that the state of the blood affects the center directly, and not reflexly, by stimulating the endings of afferent nerves in various parts of the body; because if the supply of blood be cut off from the medulla alone the same effects are produced. Venous blood differs from arterial blood in containing less oxygen and more carbonic acid. The deficiency of oxygen is the cause of the greater activity of the center, because if an animal breathe an atmosphere of nitrogen the carbonic acid does not accumulate in the blood, and yet convulsions occur; whereas if the animal breathe an atmosphere containing sufficient oxygen but excess of carbonic acid, then the convulsions do not occur, but the animal may become unconscious through some of the higher centers being poisoned. When in action the center discharges motor impulses down various nerves to all the muscles.

If any of the nerves be cut the movements of the muscles supplied of course cease, since they are no longer stimulated by impulses proceeding from the center.

Chemistry of Respiration.—We have now to explain the passage of oxygen from the air chambers of the lungs into the blood that circulates in the vessels of the chamber walls, and the passage of carbonic acid from the blood into the air within the lungs.

In order to understand what follows we shall have to study the laws of diffusion. A gas consists of a great number of separate molecules moving with great speed. The number of these molecules in a cubic inch of a gas (at ordinary temperature and pressure) is estimated about 10^{21} or 1,000,000,000,000,000,000. Each molecule is so small that the space between adjacent molecules is large compared with the size of the molecules; therefore, each molecule during its movement has a large path free from collision with other molecules. The

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average speed of a molecule varies with the temperature, increasing as the temperature rises. The molecules lying near the surface of any mass of gas will constantly impinge upon the boundaries; these impacts are so numerous and so close that they produce an apparently continuous pressure all over the boundary. This pressure obviously depends only on the density (number of molecules in unit space) and the temperature (average speed of the molecules) of the gas. Further, the molecules of a gas are so far apart that when two or more gases are mixed their molecules interfere so little with each other that each gas exerts the same pressure upon the walls of the containing vessel as it would do were it alone present. In such a case the total pressure is the sum of the two or more partial pressures of the several gases. If the space in which a gas is enclosed be diminished the molecules are brought nearer to each other, till a point is reached at which many of the molecules apparently act upon each other in such a way as to become more complex molecules, thus forming a liquid in the lower part of the vessel with its gas in the upper part. The complex molecules are still in motion, and interchange, or diffusion, constantly takes place between the two regions. The number of molecules leaving the gaseous region depends only on the state (temperature and density) of the gas. The number leaving the liquid depends only on the state (temperature and density) of the liquid. When the diffusion takes place in a closed space a state of equilibrium of interchange is soon reached. In the lungs the liquid molecules of the oxygen of the blood are being constantly moved past the common surface between the air and the blood; the inflow therefore of oxygen from the air into the blood is greater than the outflow from the blood to the air. On the other hand, the gaseous carbonic acid in the air is constantly removed from the common surface between it and the blood; and therefore the outflow of carbonic acid from the blood into the air is greater than the inflow from the air into the blood. This picture of the state of matters that regulate the interchange of gases in respiration is simpler than the reality. The further complexity will be described immediately.

We must know what are the laws governing the diffusion when the gas above the liquid is not the gas of the liquid, as is the case when air rests on a surface of water. Some of the molecules of the air will become entangled in the liquid, will form the liquid of the particular gases within the other liquid, and then the state of affairs will be as before, so far as the gases, and their liquids, of the air are concerned, and a state of equilibrium between each of

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these gases and its own liquid will be formed. But now suppose that the liquid and the gas have a special chemical affinity for one another, as is the case with the oxygen of the air and a substance in the blood, and as is the case with the carbonic acid of the blood and a substance or substances in the blood. As soon as the gas has diffused into the liquid the chemical compound will be formed; but now the reverse effect will begin, dissociation of the compound will occur, but slowly, because a greater violence of collision is necessary. Therefore, other things being equal, less pressure will be needed to maintain equilibrium, because fewer liquid molecules of the compound will become gaseous, and therefore fewer gaseous molecules need become liquid to preserve equilibrium. Indeed, it is found that at a certain temperature and a certain pressure the dissociation scarcely takes place at all; but if temperature be raised, or if the pressure be lowered to a certain point, then the dissociation will be very rapid.

These laws of diffusion apply to the gases of the blood. In the investigation of these gases a sample of blood is placed under the receiver of an air pump (thus imitating though exaggerating, the normal pumping action of the chest walls), the gases extracted are passed through various solutions which retain the several gases, and thus they may be estimated and examined. The quantity of oxygen obtained from arterial blood is greater than that obtained from venous blood. The arterial blood of a dog yields for every 100 volumes at ordinary pressure and 0° C. 58.3 volumes of mixed gases when the external pressure is reduced to zero. This mixture is composed of 23.2 volumes of oxygen, 34.3 volumes of carbonic acid, and 1.8 volumes of nitrogen.

If blood took up as much of these gases by mere diffusion as water does, it would contain 0.86 volumes of oxygen, 1.2 volumes of carbonic acid, and 1.6 volumes of nitrogen. Therefore it is evident that, while the nitrogen is merely diffused into the blood, the oxygen and the carbonic acid must be combined with some substance or substances in the blood. If we gradually lower the external pressure of the atmosphere upon the blood we notice that at any given temperature (at which the combination can exist) the pressure may be lowered to a certain point without much gas coming off, and that at that point the gases begin to come off rapidly. This is another proof that the gases are combined and not merely absorbed in the blood; for in case of simple absorption the gases come off in equal amounts for equal lowerings of pressure. The amount of the gases that can be taken from blood plasma (free from blood cells) is 0.26 volumes of oxygen, 35.26 volumes of carbonic acid, and 2.24 volumes of nitro-

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gen. The great mass of the oxygen is, therefore, not in the plasma, but in the corpuscles; while the great mass of the carbonic acid is in the plasma. The oxygen is found to be united to the red coloring matter, of which the red blood cells are chiefly composed. This substance is called hæmoglobin. It is not so easy to determine in what combination the carbonic acid exists in the plasma. A certain amount is found in the red corpuscles (though the above figures do not show it); indeed, some writers consider that the hæmoglobin of these cells is the chief carrier of carbonic acid. The effect of lowered pressure on blood plasma, so far as regards carbonic acid, is much the same as it is on solutions of sodium hydrogen carbonate. Some writers believe that the carbonic acid exists in the plasma in the form of sodium bicarbonate. Others believe that it may be in the form of bisodium hydrogen phosphate. The presence of red blood corpuscles has a very marked effect on the disengagement of carbonic acid under lowered pressure; it hastens it considerably. This effect appears to be due to the presence of oxyhæmoglobin.

The total pressure of the atmosphere is 760 mm. of mercury. The partial pressure of oxygen in the air is 159.6; of carbonic acid, practically zero; of nitrogen, 600.4. Oxygen does not leave arterial blood till the partial pressure falls to 29.64, nor venous blood till the pressure falls to 22.04; these therefore are the partial pressures of oxygen in arterial and venous blood. Carbonic acid does not leave arterial blood till the partial pressure falls to 21.18, and venous blood till it falls to 41.04. Therefore blood exposed to air would readily gain oxygen and lose carbonic acid. But the air in the part of the lungs where the respiratory interchange takes place is not the same as the air surrounding the body; the partial pressures of expired air will be nearer the true numbers; they are — of oxygen, 121.6; of carbonic acid, 33.4; of nitrogen, 600. But even expired air is not the same as air within the alveoli; for the air taken in and out of the lungs (tidal air) only enters and leaves the larger respiratory passages near the opening into the outer air; from these it diffuses into the air of the alveoli. The partial pressures of this air have been estimated by introducing a collector into the alveoli and taking out samples. Specimens of air collected in this way have been found to have the following partial pressures: Oxygen, 27.44; carbonic acid, 27.06; nitrogen, 705.5. The venous blood flows through the lungs, and issues as arterial blood, and yet the partial pressure of oxygen in arterial blood is higher than it is in alveolar air, the place from which it must have come; while the pressure of carbonic acid in arterial blood is lower than it is in alveo-

lar air, the place to which it has passed. We must therefore conclude that the living alveolar wall has exercised some influence on the gases in virtue of its secreting and excreting activity; it has done work against the molecular energies that produce diffusion. But the numbers given by various authors for the partial pressure of the gases in the various places differ, so that perhaps no thoroughly reliable conclusion can be drawn from them. Still in any case the slight differences of partial pressure, especially of oxygen, render the validity of any explanation of the rapidity of gaseous interchange within the lungs in terms of ordinary diffusion extremely doubtful. A possible aid to the interchange has recently been suggested in the sudden stroke of the heart, which would have an accelerating effect on the liberation of gases from a fluid under low partial pressure; just as a tap upon the sides of a glass containing soda water will cause bubbles of carbonic acid to be given off. Further, as already stated, some carbonic acid is combined with hæmoglobin. This combination is, like oxyhæmoglobin, dependent on the partial pressure of the carbonic acid, and is easily given off when that pressure is lowered. Possibly the hæmoglobin may be an important carbonic acid carrier in the blood.

Effects on Respiration of the Quality and Quantity of the Gases of the Atmosphere.—The respiratory mechanism, as well as the whole body, is adapted to work with air of a certain composition, and at a certain pressure. The mechanism can adapt itself, within certain limits, to variations of composition and pressure. We have to state what these limits are, and what happens when they are overstepped. We shall study first of all, because of its practical importance, the results of breathing in a confined space, or in one insufficiently ventilated. The effect on the air of course is that the proportion of oxygen is lowered, and that of carbonic acid increased. The first effect on a person experiencing such a state of affairs is that a sense of mental and muscular fatigue occurs when the proportion of carbonic acid rises to 0.1 per cent., the normal proportion being 0.04 per cent.; and this is not due to the carbonic acid, but to the presence of organic matter, derived probably from the clothes, of the amount of which the carbonic acid happens to be a measure; for if pure carbonic acid be introduced into the air of a room, till the proportion rises to 1 per cent., no disagreeable sensations are experienced in breathing it. If the proportion of oxygen be still further diminished, or if by shutting the trachea of an animal all supply of oxygen to its blood be cut off, the oxygen of the blood begins to be used up, and carbonic acid begins to accumulate, and asphyxia sets in. There are

three stages of asphyxia. (1) The breathing becomes deeper and more rapid, the blood pressure rising at the same time. (2) The respiratory movements continue to increase in force and rapidity, extra muscles are called into play, the expiratory movements are especially marked; then all the muscles that can possibly aid in expiration are used, the excitement spreads to nearly all the muscles of the body, and convulsions set in; these violent efforts exhaust the body. (3) A stage of quiet, due to exhaustion, occurs; a few long-drawn inspiratory gasps are made, these die out; the whole body is convulsively stretched out, and death intervenes. When the trachea of a dog is artificially closed these events run their course in from four to five minutes; the convulsions appear at the end of the first minute, and cease suddenly within the second minute. In drowning death is often hastened by the entrance of water into the lungs. The time at which death from drowning occurs varies with the state of the animal at the time of the occurrence. Young animals—*e. g.*, a puppy—in which the respiratory changes are less active than in adults, may survive an immersion of 50 minutes; but a full-grown dog rarely recovers after having been 1½ minute under water. For man, see below. By training, as in the case of divers, the respiratory center may be accustomed to bear the scarcity of oxygen for much longer than it can normally.

We next consider the effects of changes in the partial pressures of the gases of the atmosphere, the total pressure remaining more or less unchanged. Lessened partial pressure of oxygen, as already noted, results in asphyxia. Increased partial pressure of oxygen results in the phenomenon known as *apnœa*. After several very deep inspirations the state known as *apnœa* occurs, and it is easy to hold the breath for a longer time than usual. The usual explanation of this has been that the oxygenation of the blood is so complete that there is enough to last some time, and the center is not stimulated by its absence or by the presence of the reducing stuff in the blood. Later authorities regard the cessation of respiratory movements which occur when oxygen is rapidly forced into the lungs by rapidly succeeding respiratory movements as due to fatigue of the respiratory apparatus. Increased partial pressure of carbonic acid tends to the accumulation of carbonic acid in the blood, ultimately producing a state of narcosis without convulsions. Decreased partial pressure of carbonic acid results merely in the carbonic acid of the blood being able to leave the blood with greater readiness. Alterations in the partial pressure of nitrogen have no effect. Ozone, instead of making the blood more arterial, as one might expect, makes it more

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venous, and causes irritation of the respiratory passages. Carbonic oxide combines with the hæmoglobin with more avidity than oxygen; consequently it interferes with due respiration. Sulphuretted hydrogen, acting as a reducing agent, has ultimately the same effect. Nitrous oxide (laughing gas) produces narcosis, and is used as an anæsthetic. Some gases — hydrogen, marsh-gas, and other neutral gases — have no effect. Some — chlorine, ammonia, etc. — cause spasm of the glottis, and so cannot be breathed.

Another point to attend to is the effect of variations in external pressure, the proportional composition of the atmosphere remaining unchanged. Sudden and great diminution of pressure will cause fatal convulsions, due to the sudden liberation of bubbles of the gases of the blood within the vessels; these plug up the smaller vessels, and affect the working of the valves of the heart, and cause asphyxia. If the pressure be gradually diminished, as in ascending a mountain, no effect even at considerable heights is experienced beyond a feeling of "distress" often accompanied by bleeding at the nose. This is due to a derangement of the vascular system, the walls being constructed to meet a certain external pressure. If only the respiratory interchange of gases were concerned, the total external pressure might be reduced from 760 mm. to 300 mm., corresponding to a partial pressure of oxygen of 76 mm., and to an altitude of 17,000 feet, before the combination of oxygen with hæmoglobin, at the temperature of the blood, would be seriously affected. In various parts of the world there are people living at an altitude of 11,000 feet. If the pressure be still further reduced asphyxia occurs, but it is not quite the same asphyxia as that which results from absence of oxygen; the characteristic convulsions are often absent, while a rapid onset of feebleness amounting almost to paralysis occurs. Increase of pressure up to a pressure of several atmospheres is followed only by symptoms of drowsiness, due probably to increasing pressure on the whole organism rather than to a direct derangement of respiration. At a pressure of 15 atmospheres, which corresponds to a partial pressure of oxygen of three atmospheres, the animal dies of asphyxia with convulsions as though from a deficiency of oxygen. The production of carbonic acid is diminished with increase of pressure — *i. e.*, the oxidations of the whole body are lessened. At a certain point these oxidations cease, and the animal dies. All living things are killed by a too great pressure of oxygen. The oxidations of some other substances — *e. g.*, phosphorus — are analogous; at a certain pressure they will not burn.

The effect of variations in temperature must not be overlooked. By variations in

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temperature we mean of course variations in the temperature of the body and of the blood, and not merely variations in the temperature of the surrounding medium, for these have normally, in warm-blooded animals (the temperature of cold-blooded animals varies with that of the surrounding medium), no effect on the temperature of the body, owing to the regulating mechanism afforded by the vessels of the skin and vaso-motor system (see CIRCULATION). The temperature of an Eskimo is nearly the same as that of an African; and in a Turkish bath the temperature only rises a very little. In cold-blooded animals the oxidative and chemical processes of the body decrease with a lowered temperature, and increase with increase of temperature; but the reverse is the case with warm-blooded animals, for the temperature of a body in an atmosphere of low temperature is partly kept up by increased oxidation; but in fever — *i. e.*, when the temperature of the blood is actually raised — the chemical activity of the body of a warm-blooded animal rises. Such an animal dies when the temperature of its blood rises to 45° C. or 50° C., a mammal at 45° C., and a bird at 50° C. Death is due to the fact that when the temperature rises to this point the partial pressure of the oxygen of the air is no longer sufficient to maintain the combination of oxygen with hæmoglobin. Theoretically a higher temperature might be survived if the external partial pressure of oxygen were proportionally increased.

Inner or Tissue Respiration. — We now come to the last and most interesting part of our subject — the manner in which the oxygen of the blood enters the tissues, the use made of this oxygen by the cells of the tissues finally resulting in the formation of carbonic acid, and the manner in which this carbonic acid leaves the tissues and enters the blood. The term "inner respiration" is by some writers restricted to the interchange of the gases between the tissues and the blood; but it is usual and more convenient to include in that term what is known of the uses made of the gases by the cells. We have spoken with confidence of this respiratory action of all the cells of the body, but we must not forget that it has not always been believed in, and even now is doubted by some. The original theory was that the oxygen was used, and the carbonic acid formed, in the lungs only. This was disproved when it was shown that there is more oxygen and less carbonic acid in the blood coming from the lungs than in that going to them. Next it was, and still is by some, thought that the oxidations take place within the blood; the cells of the tissues were imagined as pouring oxidizable matters into the blood. Usually very little matter capable of taking oxygen away from a loose combination can be found

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in the blood, but in that of asphyxiated animals more of such matter was found; this was explained by supposing that in asphyxia the oxidizable excreta from the cells accumulated in the blood through insufficiency of oxygen; but it has recently been shown that this reducing stuff only exists in the red blood cells—*i. e.*, in the reduced hæmoglobin—while lymph, which we might expect to find rich in such matters, it being into the lymph that most of the excreta of the cells are poured, is totally devoid of it. Lastly, the supposition that the cells of the tissues use the oxygen directly is so much in harmony with all our present ideas of animal physiology and with the facts of comparative respiration (one-celled animals breathe, and plants breathe, and in these there is no circulating blood) and of embryology (the embryo mammal breathes though its blood-vessels are not connected directly with those of its mother) that one is disposed to believe it without further proof.

The mode of interchange of gases between the blood and the tissues must be the same as that with which we are already familiar—*viz.*, the diffusion from a place of high partial pressure to one of lower partial pressure. The fact that a low partial pressure of oxygen is constantly maintained within the tissues is one of the phenomena that constitute the mystery of life. We have already seen that even in outer respiration the living cells of the essential membrane of the lungs may apparently do work against partial pressure, absorbing more oxygen and excreting more carbonic acid than the differences of pressure will account for; it is therefore extremely probable that a similar state of activity is characteristic of the cells of the other tissues. Taking the more obvious facts first, we know that with any weight of body—*i. e.*, with a given amount of tissue to be supplied with oxygen—the amount of oxygen taken in and of carbonic acid excreted varies with the activity of the organism and with the amount of work that it is doing; it is greater in youth than in old age, in wakefulness than in sleep, during the activity of secreting glands than when these are at rest, during the performance of muscular work than in repose; in this case it is the excretion of carbonic acid rather than the intake of oxygen which is especially marked. This last peculiarity brings us face to face with a remarkable state of affairs. The partial pressure of oxygen within muscular tissue is always practically zero—*i. e.*, however low the external pressure of oxygen may be, none will leave the muscle. The effect of this of course will be, so far as ordinary diffusion is concerned, that oxygen will always be leaving the blood and entering the tissues. This oxygen is in some way stored up within the muscle cells, so that a muscle

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will work for a considerable time without any fresh supplies of oxygen, even in an atmosphere of nitrogen. This explains the fact noted above, that during muscular work the excretion of carbonic acid is in excess of the absorption of oxygen. A supply of oxygen, however, is necessary for the maintenance of the irritability of the muscle, which soon falls off without it, probably before the supply of stored oxygen used for the performance of its work has been exhausted. This is about all that is known of the chemical changes connected with respiration within a cell. The oxygen enters it by diffusion, possibly aided by some vital activity; the rapid storing away of the oxygen and consequent readiness to absorb more is in reality an example of such activity; the oxygen is made use of within the cell for maintaining its life, for producing heat, for producing rapid decompositions which supply the energy of muscular contraction; finally the carbonic acid leaves the cell and enters the blood, possibly aided in this process by some process other than a simple diffusion. The respiratory changes of other tissues are probably similar to those of muscle; within them, within the lymph that bathes them, and within their secretions there is practically no free oxygen, while the pressure of carbonic acid, owing to its constant production within the cells, is greater within the cells, their secretions, and the lymph that bathes them than it is in venous blood.

There is another fact about respiration which is still a puzzling matter, and, since it results from the changes within the cells, is likely to remain so for some time. All the food of a meal, or its equivalent, is in about six hours oxidized into carbonic acid, water, and urea. This is obvious without any elaborate calculations from the fact that we may eat every six hours and yet not gain in weight, while, apart from the indigestible parts of the food, which do not affect the problem, the chief matters that leave the body are those mentioned above. Yet food stuffs outside the body are not affected by oxygen at the temperature of the body. Various suggestions as to the possible reason for this have been made; but, since the phenomenon is obviously dependent upon the vital processes of cells, suggestions in terms of the principles of ordinary chemistry cannot carry us far.

History.—Aristotle (384 B. C.) thought that the object of respiration was to cool the body. He observed that the warmer the animal the more rapid the breathing, and transposed cause and effect. Galen (A. D. 131–203) experimented on the mechanics of respiration, and knew something of the nervous mechanism. He believed that “soot” and water were excreted from the body by the lungs. Malpighi (1661) described the structure of the lungs. Van

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Helmont (1664) discovered carbonic acid; Black (1757) observed that carbonic acid is breathed out of the body. Priestley (1774) discovered oxygen. Lavoisier (1775) discovered nitrogen, found the composition of the air, and taught that the formation of carbonic acid and water resulted from the combustion that took place in the lungs. Vogel proved the existence of carbonic acid in the venous blood; Hoffmann found oxygen in arterial blood. Magnus extracted and analyzed the gases of the blood in both states.

Comparative.—Most of the Protozoa, all the sponges and stinging animals, and many simple worm-types live in water, which washes their surface and saturates their substance, the oxygen dissolved in the water serving the same purpose as that mixed with the air. While many worms breathe simply through their skin, many of the aquatic forms have structures specialized for respiration—modifications of the legs or tentacles or vascular outgrowths of the body wall. In Echinoderms respiration is effected by the tube-feet, and sometimes by hollow “skin gills” as well. The crustaceans usually breathe by gills or through the skin; in Peripatus, Myriopods, and insects air tubes or tracheæ ramify throughout the body. Scorpions have plaited sacs or “lung books,” which many regard as modifications of tracheæ; and these are developed in spiders also, with, or rarely, without the addition of ordinary air tubes. The king crab has a unique arrangement, consisting of plaited sacs or “gill books,” adapted for breathing in water. Some mollusks breathe simply by the skin, others have external gills, most have gills sheltered by the mantle, and air-breathing forms like snails have a mantle cavity which serves as a lung. In Balanoglossus there are numerous respiratory clefts opening from the pharynx to the exterior; Appendicularia and young Tunicates have a pair of these; in adult Tunicates the primitive clefts are replaced by numerous secondary slits on the wall of the pharynx, through which water drawn in by the mouth passes into an atrial or peribranchial chamber and thence to the exterior; the same is true of Amphioxus. Clefts from the wall of the pharynx to the exterior are, indeed, characteristics of vertebrates, but beyond amphibian they are transitory embryonic structures, never used for breathing. This loss of functional gill clefts is associated partly with the development of an embryonic birth robe known as the allantois, which secures the aeration of the embryo's blood, and partly with the transition from aquatic to terrestrial life. In the hagfish the nasal sac opens into the mouth; in fishes this is only true of the double-breathing Dipnoi; in all other vertebrates air passes through

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the nostrils in and out of the mouth and lungs. In the hag and lamprey there are purse-like gill pockets, and the respiratory arrangements are otherwise peculiar. In fishes gill filaments are borne on the skeletal arches separating the gill clefts, and the blood-vessels spread out on the filaments are washed by currents of water. Young Elasmobranchs have at first external gills and afterward the internal gills characteristic of all fishes. The Dipnoi have gills, but they also come to the surface and gulp air, using their air bladder as a lung, and thus pointing the way to amphibians. For, while almost all amphibians have gills in their youth, all the adults are lung breathers, though some retain their gills as well. Among higher vertebrates there are many peculiarities, such as the single lung of most serpents, the balloon-like air sacs around the lungs of birds, and the adaptations of cetaceans as aquatic lung breathers, but the essential characteristics of pulmonary respiration are the same in all. The hæmoglobin, so important in respiration, occurs first in Nemerteans, and is present in some other worms, some Echinoderms, a few Arthropods, some mollusks, and in all vertebrates except the Tunicates, Amphioxus, and a few exceptional fishes. But though hæmoglobin is not present in most invertebrates, analogous pigments are common, especially one called hæmocyanin, which turns bluish when oxidized.

Artificial Respiration.—When death is imminent owing to a cessation of the natural respiration movements, it may sometimes be averted by an imitation of them carried on regularly for some time. Such a condition may occur in disease (*e. g.*, asthma, epilepsy), though very rarely; it is most common in suffocation, either by drowning, choking, or strangulation, and is sometimes met with also in poisoning by noxious vapors (*e. g.*, carbonic acid, carbonic oxide, coal gas, chloroform, etc.). In order that any method may have a chance of being successful it is of course necessary that the entrance of air into the lungs be not impeded, either by a piece of food or by water in the windpipe, or by the tongue falling back and closing the upper opening. A piece of food may sometimes be removed through the mouth by the finger; if this fails the windpipe should be opened. In those apparently drowned the body should first be laid on the face, with the head low, and the thorax and abdomen pressed on in order to expel fluids which may have been drawn into the trachea and bronchial tubes. The tongue may need to be held forward; this may be done by an assistant, or an elastic band passed round the tongue and the chin will effect the object.

Numerous different methods have been devised for effecting the objects aimed at, and no general consensus of opinion has yet

been arrived at as to which is the best. The methods fall into three divisions: (1) insufflation, or blowing of air into the lungs, either by the mouth or by means of bellows; (2) manual methods, in which external manipulations of the chest walls are made to effect the entrance and exit of air; (3) electrical stimulation of the respiratory muscles. In all cases where artificial respiration is required every moment is of importance. It is doubtful whether life can ever be restored when the heart has ceased to beat for more than a few seconds; and when breathing has stopped failure of the heart's action is always imminent. That method is therefore best which can be applied with the least possible loss of time, so that under ordinary circumstances the methods which require bellows or electric batteries are out of the question. Direct insufflation, or blowing of air into the patient's lungs by the mouth applied to his mouth, is now hardly ever used except in the case of very young children. Of the manual methods those most in use are Marshall Hall's (1856), Silvester's (1857), and Howard's (1877). The second is certainly the most easy to learn, but is more fatiguing to carry out for a length of time than either of the others. In Marshall Hall's method the body is laid upon its face and rolled "in what may be termed cradle fashion" from this position on to one side and a little beyond it (inspiration), and then back on to the face (expiration). In Silvester's method the patient is laid on his back on a plane, inclined a little from the feet upward, and the shoulders are gently raised by a firm cushion placed under them, which also throws the head back. The operator then grasps the patient's arms just above the elbows, and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated. In Howard's method the patient is laid on his back with a cushion below the middle. The operator kneels astride his hips, places his hands with fingers spread outward over the lower part of the chest wall, and alternately bends forward, throwing his weight on the chest to imitate expiration, and springs back to allow the elastic recoil of the chest wall to imitate inspiration.

Whatever method be adopted, the movements must be gentle, regularly, and perseveringly carried on, at the rate of from 10 to 15 times in the minute; and when the faintest natural effort at respiration is observed they must at once be timed so as to reinforce and not to oppose it. In some cases life has been restored under artificial respiration when no respiratory movements have occurred for an hour or even several hours. In all cases, but especially in that

of persons apparently drowned, artificial respiration should be conducted in a warm atmosphere, 90° F., or even more if possible, and should be supplemented by warmth applied to the body and by vigorous friction. In those apparently drowned recovery is very rare after complete immersion for five minutes or more. If stunning or fainting has occurred at the moment of immersion, so that the respiratory movements have been annulled or much diminished for the time, less water will have entered the lungs, and the chance of recovery may be greater. In other modes of death by suffocation, such as choking or strangulation, the action of the heart may continue longer, and restoration to life be therefore possible after a longer deprivation of air. See DROWNING.

Respirator, a device for breathing through, worn over the mouth, or the nose and mouth, and secured by a bandage, strap, or other contrivance, to exclude injurious matters, such as smoke or dust, from the lungs, or to change the condition of the air by passing it through medicaments or gauze. Respirators are used by cutlers and other grinders to exclude the dust from the lungs, and also by firemen to prevent suffocation by smoke. Respirators for persons having weak lungs have several folds of fine wire gauze, which being warmed by the expired breath, in turn heats the inspired air.

Respiratory Sounds, in medical diagnosis, the sounds made by the air when being inhaled or exhaled, as heard by the ear applied directly to the chest, or indirectly through the medium of the stethoscope. The respiratory sounds are of the highest importance in the diagnosis of diseases of the chest and bronchial tubes.

Respondent, in law, the designation of the party requiring to answer in a suit, particularly in a chancery suit.

Respondentia, a loan raised by the master of a ship, when he has no other means of doing so, upon security of the cargo or goods on board the ship. The contract has reference to a particular voyage, and the conditions are that if the subject on which the money is advanced be lost by sea, risk, or superior force of the enemy the lender shall lose his money; and that if the goods arrive in safety the loan shall be repaid with a greater than ordinary rate of interest, called marine interest. When the ship herself is hypothecated the contract is called bottomry. As a matter of fact the term respondentia is now seldom used, and generally the expression bottomry is employed whether the vessel or her cargo or both be the security.

Rest, a term applied to various kinds of supports; as, a support for a lance or spear, for the muzzle of a gun in aiming or firing, for the top of the cue in billiards, and for

Restaur

a piece of work in a lathe or vise. In heraldry, a name given to a figure of doubtful origin and import, taken by some for a spear rest, by others for a musical instrument, and hence called, also, an organ rest. In music, an interval of silence occurring in the course of a movement between one sound and another, hence the sign indicating the period of silence. Each note has its corresponding rest. Dots may be affixed to rests and have the same effect on them as on notes. In physics, absolute rest is the permanence of a body's position with respect to ideal fixed points in space; relative rest, that with respect to surrounding bodies.

Restaur, or Restor, in law, the remedy or recourse which assurers have against each other, according to the date of their assurances; or against the masters, if the loss arise through their default; also the remedy or recourse a person has against his guarantee or other person who is to indemnify him from any damage sustained.

Rest Harrow, a common European leguminous plant, *Ononis spinosa*, akin to the brooms. It is plentiful in stiff clay land in some parts, and derives its name from its long and strong matted roots arresting the progress of the harrow. The stems are annual, often woody or shrubby, and hairy; the leaves are generally simple, entire toward the base; the flowers, mostly solitary, large, and handsome, are of a brilliant rose color. Rest harrow is also called cammock.

Restiaceæ, restiads; an order of endogens, alliance Glumales. Herbaceous plants or under-shrubs, with leaves simple and narrow or wanting; culms naked or with sheaths; flowers in spikes or heads, often unisexual; stamens two or three; ovary with one or more cells, each cell one-seeded; fruit capsular or nucamentaceous; chiefly from South America, the Cape, and Australia; known genera 23, species 171.

Restif, Nicolas Edme (called RESTIF or RÉTIF DE LA BRETONNE) (re-têf'), a French novelist; born in Sacy near Auxerre, France, Nov. 22, 1734. He published in all more than 200 volumes, full of wit and imagination, but reflecting the licentious habits of the author and his circle. The most noteworthy are: "The Foot of Fanchette" (1769); "The Perverted Countryman" (1774); "The Life of my Father" (1778); "The Pornograph" (1796), and the remarkable "Autobiography of Monsieur Nicolas" (1794-1797, 16 vols.). He died in Paris, Feb. 3, 1806.

Restigouche, a river of Canada. It rises in Eastern Quebec, flows S. E. into New Brunswick, then E. and N. E. into the Bay of Chaleurs, forming part of the boundary between the two provinces. Its length is about 200 miles.

Restoration

Restitution of Conjugal Rights, in law, is where either the husband or the wife, without sufficient reason, lives separate from the other, in which case, if either party desires it, courts will compel them to come together again.

Restitution Edict, an edict published A. D. 1629 by Ferdinand III., Emperor of Germany, ordering the Protestants to deliver up to the Roman Catholic authorities all ecclesiastical property which had fallen into their hands since the religious peace of Passau established in the previous century. In 1648, at the end of the Thirty Years' War, the edict was revoked.

Restitutionists, a religious sect in New England. They believe that what man lost in the fall is now beginning to be restored, and that everything is to come back to its original form and purity. Their Sabbath, therefore, occurs on Saturday, as the original day of worship; and their meetings are held Friday evening, because it is Sabbath eve.

Restoration, a term used in art to indicate the renewal or repairing of paintings, sculptures, buildings, etc., which have been defaced or partially ruined. It includes the retouching of faded and injured pictures (see RESTORATION OF PICTURES), and the replacing of lost limbs or features of antique statues. But in reference to architecture its meaning is broader; it indicates, first, a representation, by picture or model, of a ruined structure restored to its original state; secondly, the rebuilding of dilapidated or fallen portions of an edifice; and thirdly, taking down so-called "debased" work in a composite building, and replacing it by architectural features in harmony with the general style of the ancient edifice. The first attempts to reproduce Gothic work followed on the decay of the Renaissance style of architecture, and constituted the germ of the modern restoration movement, or Gothic revival, as it is generally called. This movement began to work actively about the beginning of the 19th century, and was largely accelerated by a revival of activity in the Established Church of England. An impulse was given to the restoration movement by a society called the Camden Society, and afterward the Ecclesiological Society, which was composed of churchmen and clergy, and started at Cambridge in the year 1840.

The movement produced specialists, of whom Sir Gilbert Scott (see SCOTT, GEORGE GILBERT) was the most noted. In his hands was placed nearly every cathedral church in England, as well as a countless number of parish churches. As examples of "restoration" works we may give the N. transept of Westminster Abbey and the W. side of Westminster Hall, nearly the whole of St. Alban's Abbey, the W. front of Salisbury

Cathedral (where an attempt has even been made to produce mediæval sculpture), Chester Cathedral, Worcester Cathedral; in fact, not a cathedral remains in England that does not bear marks of the movement. The "restoration" movement spread to Scotland, the Continent, and even to India, but a reaction set in, and later sentiment was in favor of merely keeping in repair all ancient structures.

Restoration of Pictures. The restoration and the cleaning of pictures may be considered together; though cleaning, of course, more strictly applies to the removal from their surface of the accretions of dust or discolored varnish, while restoration refers to the reparation of actual flaws in their surfaces of paint, or in the canvas or wood on which the paint is laid. When a mastic varnish has been used by the painter, and has become discolored and opaque, it may be removed by careful and gentle friction with the points of the fingers, previously covered with a resinous powder, which frays off particles of the hardened coating in the form of a fine white dust. When copal varnish has been applied, its removal is more difficult and dangerous, and is usually affected by an application of weak alcohol, spirits of turpentine, and oil. A pad of cotton wool is saturated in this mixture, and passed over the surface of the varnish, which it dissolves and removes; a similar pad steeped in pure oil being applied at intervals to stop the action of the spirit when it threatens to disturb the color beneath the varnish. When portions of the paint or of the ground of priming on which it has been laid have been removed, these are sometimes filled up to the level of the remaining portions with glue, size, and chalk, and then carefully repainted with dry color to match the surrounding portions of the surface.

The injuries of time to the various materials on which colors are laid are very various, and require careful and skillful treatment. In panel pictures worm holes must be carefully filled up with the last-named composition, and matched with the adjacent portion as just described. If the wood has split, its edges must be carefully brought together, and fastened securely with "buttons" of hard wood; or the entire back may be protected with a kind of grating of mahogany spars, so adjusted as to admit of a slight contraction and expansion of the panel in varying temperatures. If the panel be too far gone to admit of this treatment, the wood is carefully removed by tenon-saws, planes, and files, till only the surface of priming and color remains, which can then be remounted on canvas or a fresh panel. If the picture is on canvas which has become decayed, it may be "relined" by having its back securely

fastened, by paste or glue, to a new canvas, and afterward ironed, a process which has the effect of restoring evenness to a cracked surface of paint; though if the artist has worked with a thick impasto the raised points of color are apt to become flattened, and the character of the handling to be slightly altered. When a fresco has to be removed from a wall this is usually effected by pasting its surface on paper, and then with a chisel slowly detaching the mortar which bears the color from the stones on which it has been laid, each portion, as it is gradually withdrawn, being coiled on a large cylinder. All the operations to which we have referred require extreme caution and great practice for their successful accomplishment. It is impossible to estimate the immense amount of injury to works of art that has been effected by ignorant picture-restorers. Proper care of a picture, however, and preservation from damp and dust, will obviate the necessity for its being subjected to restoration; and such protection may be most simply effected by carefully closing in its back, and by covering its surface with glass, which answers all, and more than all, the preservative purpose of varnish, with the additional advantage that it does not chill and discolor with time. Glass is being largely adopted in the great public galleries, for covering even oil-pictures, and it has only one disadvantage—its tendency to reflect the objects placed opposite it, and so to interfere with the ready and complete examination, as a connected whole, of the entire surface of a large, and especially of a dark, painting.

Restoration, The, in English history a term applied to the accession of King Charles II., in 1660, after the civil war, to the throne of England, after an interregnum of 11 years and four months, from January 30th, 1649, (when Charles I. was beheaded) to May 29, 1660. In French history, the first restoration begins May 3, 1814, when Louis XVIII. made his entry into Paris under the protection of foreign bayonets, and ended with the return of Napoleon from Elba, March 20, 1815. The beginning of the second restoration is generally reckoned from the battle of Waterloo, June 18, 1815, and terminated on July 29, 1830, with the abdication of Charles X.

Restorationists, in Church history, the followers of Origen in the opinion that after a certain purgation proportionate to their delinquencies all will be restored to God's favor and to paradise. In the Middle Ages, the Brethren of the Free Spirit held this doctrine; at the time of the Reformation, it was taught by the Anabaptists and in the 18th century, by the Rationalists.

Resultant, in mathematics, an eliminant. In mechanics, a single force which is equivalent in effect to two or more forces; the

Resumption

single force which represents the combined effect of several forces; relatively to the resultant, these several forces are termed components or component forces. When two forces act on a particle in the same direction, their resultant is equal to their sum, and acts in the same direction. When two forces act on a particle in opposite directions, their resultant is equal to their difference, and acts in the direction of the greater force.

Resumption, the return to specie payment by a government. The Resumption Act of Jan. 14, 1875, fixed Jan. 1, 1879, as the day on which specie payments should be resumed by the United States government. Resumption actually took place on Dec. 17, 1878, when the premium on gold disappeared. In English law, resumption is the taking again by the crown of such lands, tenements, etc., as on false suggestion, or other error, had been granted by letters patent.

Resurrection, an expression denoting the revival of the human body in a future state after it has been consigned to the grave. Traces of this doctrine are found in other religions, in Zoroastrianism, and especially in later Judaism, but the doctrine is peculiarly Christian. In the earlier Hebrew Scriptures there is no mention of it. It is not to be found in the Pentateuch, in the Psalms, nor even in the earlier prophecies. It is supposed to be alluded to in Isaiah (xxvi: 19), and in Ezekiel (xxxvii:) in the well-known chapter as to the revival of dry bones in the valley of vision; and in the last chapter of Daniel (xii: 2) there is the distinct affirmation that "many that sleep in the dust of the earth shall awake, some to everlasting life, and some to shame and everlasting contempt." There is also a well-known passage in Job (xix: 25-27) which was long thought to refer to the doctrine of the resurrection of the body; but all recent criticism denies the validity of this reference. It is therefore not till the later Judaism that the doctrine appears; and it is sometimes said, doubtfully, to have been derived from Persia or elsewhere. In the time of our Lord it had become a formal doctrine of the Pharisees. The general body of the Jewish people seem also to have believed in it; the Sadducees alone disputed it. It appears, in fact, to have become bound up in the Jewish mind with the idea of a future life, so that an argument which proved the one proved the other. It should be added that Mohammedanism cherishes gross beliefs on this head.

It remained for Christ and His apostles to reveal clearly the doctrine of the resurrection of the body, and to connect it with the fact of Christ's own resurrection as its special evidence and pledge. The following may be stated as the main points involved

Resurrectionists

in the doctrine as revealed in the New Testament: (1) The resurrection of the dead is ascribed to Christ Himself; it will complete His work of redemption for the human race (John v: 21; II Cor. xv: 22 sq.; I Thess. iv: 14; Rev. i: 18). (2) All the dead will be raised indiscriminately to receive judgment according to their works, "they that have done good, unto the resurrection of life; and they that have done evil, unto the resurrection of damnation" (John v: 21-29; I Cor. xv: 22; Rev. xx: II). (3) The resurrection will take place at "the last day," by which seems to be meant the close of the present world (John vi: 39, 40, xi: 24; I Thess. iv: 15). (4) The great event is represented as being ushered in by the sound of a trumpet, a representation probably borrowed from the Jewish practice of convening assemblies by sound of trumpet (I Cor. xv: 52; I Thess. iv: 16). (5) As to the character of the change through which our bodies are raised after the lapse of ages, and yet retain their identity preserved there is nothing distinctly made known. The possibility of such a change was evidently a subject of argument in the primitive Christian age, and the apostle argues strongly in its favor (I Cor. xv: 32 sq.) from occurrences which are scarcely less mysterious in the natural world.

The Gnostics denied the resurrection of the body, and made the change a purely spiritual one. The Catholic belief was greatly developed by Tertullian, Jerome, and Augustine, who, however, insisted that the resurrection body, though identical with the original one, is a glorified body. A third view, represented in ancient times by Origen, and recently by Rothe, affirms that the spirit must always have a bodily organism, and that the perfected personality necessarily assumes a spiritualized embodiment; in this view resurrection is limited to perfected spirits.

Resurrection, Congregation of the, a society of Roman Catholic priests founded in Rome in 1836.

Resurrectionists, or Body Snatchers, a name popularly given to those who made it their business to dig corpses out of their graves and sell them as "subjects" to lecturers on anatomy. Gradual progress in the science of anatomy led to its more thorough study by greatly increased numbers of medical students; and about the beginning of the 19th century, professors of anatomy found that the supply of subjects, heretofore mainly obtained from the bodies of executed criminals, was altogether inadequate to meet the wants of the surgical and medical schools. This gave rise to the business of the resurrectionists, who drove a most flourishing trade—the graveyards in the outlying parts of London being their chief

field of action. Grave diggers and sextons were bribed to leave graveyards unlocked and keep out of the way when a body was being raised. A very short time, usually at dead of night, sufficed; an expert pair of resurrectionists being able in about 45 minutes to pry up the coffin out of a newly-made grave by means of a peculiar crowbar for the purpose, to burst in the lid, and remove the corpse. Corpses resurrected after this fashion seem to have been worth \$40 or \$50—offering large profits and quick returns to this precarious and risky trade. The body snatchers carefully replaced the clothing in the coffin; the stealing of the naked corpse being by the law of England a misdemeanor only, whereas the removal of the clothes was of course a felony, punishable by transportation. So notorious did the practice of resurrectionism become that in many parts of the country painful precautions against it were regularly taken. Heavy gratings were securely fixed over new made graves, spring-guns were set, and often the relatives of deceased persons sat armed by their graves night after night till it was assumed that the corpses would be no longer serviceable to “the doctors.” Guard houses or towers were sometimes built for the accommodation of the watchers. To the popular horror of this degrading calling, recruited from the worst classes, was added a strong suspicion that resurrectionists would on occasion manufacture corpses. The passing of the Anatomy Acts of 1832 and 1871 rendered the trade of the resurrectionists superfluous. Single instances of a special kind of resurrectionism have occurred more recently; it is practised expressly with the hope of obtaining a reward from the relatives of the person whose body is stolen. The millionaire Alexander T. Stewart, died in April, 1876. His body was embalmed and buried in a triple coffin in the family vault in a church graveyard; two and a half years afterward the body was removed, and a reward of \$25,000 was offered by advertisement for its restoration. The body snatchers, represented by a regular practising lawyer, demanded \$200,000, then \$100,000, and after three years were believed to have restored the body on payment of \$20,000, a promise being exacted that no attempt should be made to discover the thieves. The body of the Earl of Crawford and Balcarres, who died in Florence, Italy, in December, 1878, was removed from the mausoleum at Dunecht, near Aberdeen, a year afterward; but in this case no reward was offered, and the body was found in a wood close by, seven months after its removal.

Reszke, Edouard de, a Polish opera singer; born in Warsaw, Poland, Dec. 23, 1855; a brother of Jean de Reszke. He

made his first appearance in Paris, in 1876, taking rank as a leading star with a voice of remarkable range and power. He made several visits to the United States filling the chief rôles in grand opera, his leading rôles being Mephistopheles, Don Basile Leporello, Frere Laurent, and Ruy Gomuz. In professional life, he was almost constantly associated with his brother.

Reszke, Jean de, a Polish opera singer; born in Warsaw, Poland, Jan. 14, 1852. His début was made in Venice in 1874, under the name of De Reschi, as a baritone. In 1876 and in 1883 he sang at the Theater François, Paris; and in the latter year, his voice changed to a tenor of remarkable scope. After 1884 he sang, with the exception of occasional absences, at the Italians in Paris.

Retainer, a preliminary fee paid to a counsel to secure his services, or rather to prevent the other side from securing them. A special retainer is a fee paid to secure a services of counsel for a particular case. A general retainer is a fee paid to secure a priority of claim on a counsel's services for any cause which the party paying the fee may have for trial.

Retaining Wall, a wall erected to maintain a bank of earth in position, as in sunk fences, faces of earthworks, railway cuttings,



RETAINING WALLS.

sea-walls, etc.; strictly speaking, a wall erected to hold an artificial bank in upright or nearly upright position.

Retama, in botany, a genus of Cytiseæ, closely akin to Genista and Sarothamnus. *R. rætam*, a white flowered species growing in Arabia and Syria, was probably the Hebrew *rothem*, improperly rendered juniper tree, under which Elijah sat (I Kings xix: 5). The Arabs applied the shoots macerated in water to wounds, and drank an infusion of the bitter roots for internal pains.

Retardation, in physics, the act of hindering the free progress or motion of a body, and ultimately therefore stopping it. It arises either from the friction of the surface upon which the body moves, or the resistance of the medium through which it moves. In music (1) a gradual slackening

Rete Mirabile

of pace in the performance of a passage. (2) The holding on of a concordant note into the succeeding chord, in such a manner that it becomes a discord, which is resolved upward. A discord or retardation is thus opposed to a discord or suspension, the latter being resolved downward. Three or more parts may be retarded or suspended, and retardations and suspensions may occur in the same chord.

Rete Mirabile, an artery which abruptly divides into small anastomosing branches, these again often uniting to reconstruct and continue the trunk. The rete mirabile of Galen is formed by the intracranial part of the internal carotid artery of the sheep and several other mammals.

Rete Mucosum, in anatomy, the deepest layer of the epidermis or scarf skin, resting on the cutis vera or true skin. It is the seat of the color of the skin, and in the negro contains black pigment.

Retene, a hydrocarbon, $C_{18}H_{18}$, found, in the form of fatty scales, on fossil pine wood, and also produced by the dry distillation of very resinous fir. It crystallizes in colorless laminae, melts at 99° , boils at 365° , is slightly soluble in alcohol, easily in ether, and forms an orange yellow, crystalline compound with picric acid.

Retene Sulphuric Acid, $C_{18}H_{18}S_2O_6$; formed by prolonged contact of retene with strong sulphuric acid. It crystallizes in a solid mass, and forms a barium salt yielding needle-shaped crystals.

Retention, in law, a lien; the right of withholding a debt or of retaining property till a debt due to the person claiming this right be duly paid.

Rethel (rā'tēl), **Alfred**, a German historical painter; born near Aix-la-Chapelle, May 15, 1816; studied at Düsseldorf, Prus-



DEATH AS A RIDER, BY RETHEL.

sia, (under Schadow), Frankfort (under Veit and Schwind), and Rome. His greatest works are four frescoes in the town house of Aix-la-Chapelle representing incidents connected with the life of Charle-

Retinasphalt

magne, other four there being executed from his designs after his death. These are among the finest modern works of the kind. German history and the Bible also furnished him with various subjects, and he painted in water-color a series of pictures on the "Dance of Death," and one illustrative of Hannibal's passage of the Alps. He died in Düsseldorf, Dec. 1, 1859.

Retiarius, in Roman antiquities, a gladiator wearing only a short tunic and carrying a trident and net, with which he endeavored to entangle and dispatch his adversary, who was armed with helmet, shield, and sword.

Reticularia, in zoölogy, a name proposed by Carpenter in 1862, and now widely adopted for the *Foraminifera*. He divides it into two sub-classes, Imperforata and Perforata, the former with four orders (*Gromidea*, *Astrorhizidea*, *Miliolidea* and *Lituolidea*), and the latter with six (*Tertularidea*, *Chilostomellidea*, *Lagenidea*, *Globigerinidea*, *Rotalidea*, and *Nummulinidea*).

Reticulated Glass, a species of ornamental glassware, formerly made in Venice and recently revived. It is produced by a network of air bubbles inclosed in the glass and arranged in regular interlacing series.

Reticulated Micrometer, a kind of micrometer invented by Malvasia, and used for measuring small celestial distances. It consists of an eyepiece of low power, having stretched across it a number of wires at right angles to and at equal and known distances from each other.

Reticulated Molding, in architecture, a member composed of a fillet interlaced in various ways, like net-work. It is found chiefly in buildings in the Norman style.

Reticulated Work, a variety of masonry consisting of layers of squared stone laid horizontally and obliquely, so as to present their edges at the face of the wall, giving the appearance of a network. It was common among the Romans.

Reticulum, an extremely delicate network of tissue supporting the proper nervous substance in the brain and the spinal cord. Also the second stomach of ruminants; the honeycomb bag. In botany, the fibrous sheath at the base of the petioles of palms.

Retina, the net-like expansion of the optic nerve, lying between the black pigment and the vitreous humor of the eye. It is the only part immediately concerned in the act of sensation.

Retinasphalt, in mineralogy, an earthy, brown substance found in lignite in Devonshire, England; hardness, 1-2.5; sp. gr., 1.135; luster, somewhat resinous to earthy; flexible and elastic when first obtained, but becomes brittle on drying. Alcohol dissolves out 53.92 per cent.; this is the retin-

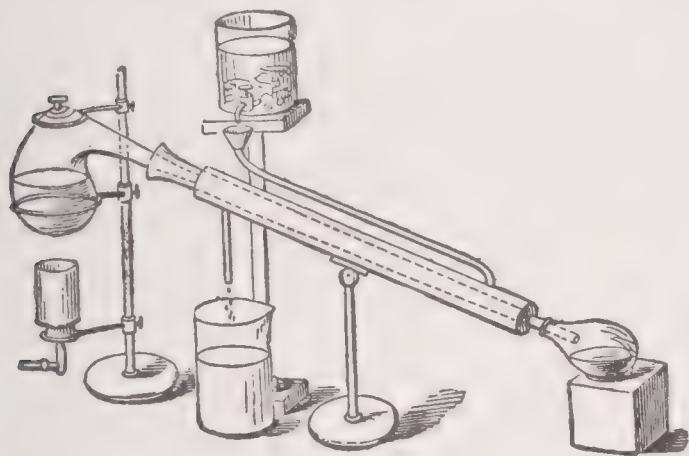
Retinite

ellite. The remainder has not been examined.

Retinite, a fossil resin found in the lignite beds of Devonshire, Hanover, and elsewhere.

Retirade, a kind of retrenchment in the body of a bastion or other work to which a garrison may retreat to prolong a defense. It usually consists of two faces, which make a reëntering angle.

Retort, a vessel in whose chamber an object is subjected to distillation or decomposition by heat, a neck conducting off the volatile products. The retort of the chem-



RETORT WITH CONDENSER.

ical laboratory is a vessel of glass, platinum, porcelain, or other material. It is bottle-shaped, having a long neck attached, in which the products of the distillation are condensed, and from which they pass into the receiver. The retort of the gas works is a cylinder or segment of a cylinder, formed of clay or iron.

Retorted, in heraldry, a term applied to serpents wreathed one in another, or fretted in the form of a knot.

Retreat, a military operation, in which an army retires before an enemy; properly, an orderly march, in which circumstance it differs from a flight. Also a military signal given in the army by beat of drum or sound of trumpet at sunset, or for retiring from exercise or from action. In Church usage, a period of retirement to a religious house, for self-examination, meditation, and prayer. Retreats commonly last either three or seven days, and are conducted by a cleric, who delivers addresses daily. They are in use both in the Roman and among the High Church party, in the Anglican Church.

Retribution Theory, in anthropology, the term used to signify the belief in different grades of future happiness, especially in different regions of the other world, allotted to men according to their lives in this. It is very far from being universal. Probably at first the doctrine of a future life was that such life was a

Retrovaccination

mere continuance of the present, and this is called the Continuance theory; the belief passed through an intermediate stage, in which it was held that excellence, valor, social rank, and religious observance modified circumstances and surroundings in the next life, and was finally developed into a doctrine of future reward and punishment.

Retributive Theory, the theory that punishment is inflicted in retribution for an offense, and should if possible be similar in character to the misdeed which it punishes. It was acted on in the early legislation of all countries. Its principle was, "An eye for an eye, and a tooth for a tooth" (Exod. xxi: 24). It has been displaced by the view that no more punishment should be inflicted by human law than is sufficient to deter others from committing the offense. Even capital punishment is not defended on the principle that "Life shall go for life" (Deut. xix: 21), but because it is believed that with abandoned criminals of a certain type it has a more deterrent effect than penal servitude for life would possess.

Retriever, a breed of dog, trained, as the name implies, to find out and bring back any killed or wounded game. The two varieties of retriever differ only in coat; the curly coat should curl closely and firmly all over the body, the wavy coat should fall straight and thick. The retriever makes a very good watch dog, and numberless bad specimens of the breed are to be found fulfilling this vocation only. The pure retriever is gentle in temper and easy to command.

Retrogradation, a term applied to the motion of a planet when it is in the opposite direction to that in which the sun moves among the fixed stars, that is to the right of an observer looking S. In other words, retrograde motion is from E. to W.

Retrograde, in botany, a term used of hairs on a plant, and meaning bent back or down.

Retrograde Imitation, in music, a peculiar kind of imitation so constructed that the melody may be sung backward as well as forward. The idea was probably suggested by those oracular verses of the ancients, which may be read backward or forward without injury to the words or the meter.

Retrogression of the Moon's Nodes, the motion of the moon's nodes—the two points in which the moon's orbit meets the plane of the ecliptic—in the direction opposite to that of the sun's motion in the ecliptic. The moon's nodes slowly change at each revolution.

Retrovaccination, in pathology, the act of vaccinating a cow with lymph passed

Retting

through a human body, or vaccinating a human subject with lymph derived from a cow which had been inoculated with vaccine matter from the human subject, or with lymph (from a human subject) that had been passed through the cow, retransferred to the human body, and taken again to the cow at the 5th, 19th, or other remove, as in the experiments of Ceely. Given good lymph, the result is as satisfactory as that obtained by ordinary vaccination, and, according to the German Commission on Vaccination, 1884-1885, it would be impossible to transmit syphilis from lymph obtained by any of the methods of retrovaccination. Animal lymph, on this ground chiefly, has been recommended by the German government to supersede the use of human lymph. See VACCINATION.

Retting, the act or process of steeping flax or hemp, for the purpose of loosening the fiber from the boon and woody portions by the softening of the gummy portion which binds them. Dew retting is accomplished by exposing the flax stalks to the weather, without steeping, the sun, showers, and air rotting the woody portion and washing away the mucilage. Also a place where flax is retted; a rettery.

Returning Boards, boards formed to canvass votes cast in an election. They were created in some of the reconstructed States a few years after the close of the Civil War, for the purpose of rectifying fraud or violence that might be practised on the negroes at the polls. In 1868 Arkansas established the first returning board. South Carolina, Louisiana and Florida had similar boards. The result of the presidential election of 1876 depended on the action of these State boards. In Louisiana and in Florida, the boards declared the election of Republican electors. The Circuit Court of Florida, rejecting the report of the board, decided in favor of the Democratic electors, and the Legislatures also authorized the governor to grant them certificates, the result being that three sets of certificates were made out and sent to Washington. The Electoral Commission accepted the Republican returns as the only ones regular in form. In South Carolina, Nov. 22, 1876, the Supreme Court of the State ordered the board not to carry its judicial authority into effect in counting the votes. The board, however, declared in favor of the Republican electors. The various returning boards were successively abolished by the respective State Legislatures.

Retz, Rais, or Raiz, Gilles de, a French military officer, infamous for his crimes; was a Breton of high rank, who distinguished himself under Charles VII. in the struggle with the English, fighting by the side of the Maid of Orleans. He was made Marshal of France in 1420, and soon after retired to his estates, where for over 10

Reuchlin

years he is alleged to have indulged in the most famous orgies, having kidnaped or enticed to his castle as many as 150 children, who were sacrificed as victims to his cruelty. Attempts have been made to find in him an historical original for "Bluebeard" by persons ignorant of the world wide diffusion of stories of forbidden chambers, etc. He was strangled and burned at Nantes, Oct. 25, 1440, after a trial closed by his own confession.

Retz, Jean François Paul de Gondi, a French prelate; born in Montmirail-en-Brie, France, in October, 1614. He became coadjutor to his uncle, the Archbishop of Paris; and, after many intrigues, and fighting several duels, he was made Archbishop of Corinth, and cardinal. He conspired against the life of Cardinal Richelieu, and took a prominent part in opposing Mazarin during the minority of Louis XIV. At length Mazarin, who both hated and feared him, imprisoned him in the castle of Vincennes, then at Nantes, whence he escaped, and traveled through Holland, Flanders, and England. In 1675 he wished to give up his cardinal's hat, and retire from the world, but the Pope would not receive it. He was daring, turbulent, and intriguing; and in his "Memoirs" which were written by himself during his retirement from the busy scenes of public life, he has drawn his own portrait with considerable skill and impartiality. He died in Paris, Aug. 24, 1679.

Retzsch, Friedrich August Moritz, a German painter and engraver; born in Dresden, Dec. 9, 1779; studied at the academy of his native city, where he became a professor in 1824. He acquired great celebrity by his etchings in outline of Schiller and Goethe—those of Goethe's "Faust" being particularly well known—Fouqué's tales, and Shakespeare. His masterpiece is "The Chessplayers" (Man against Satan). Retzsch likewise painted admirably in oils. He died in Dresden, June 11, 1857.

Reuchlin, Johann, a German scholar; born in Pforzheim, Baden, Dec. 28, 1455. He studied at Freiburg, the University of Paris, Basel, and elsewhere, and became familiar with Latin, Greek, and Hebrew. He was patronized by several of the German princes, and was engaged on various political missions. From 1502 to 1513 he was president of the Suabian federal court. His opposition to the proposal to burn all Hebrew books except the Bible raised a host of fanatical enemies against him, but did him no harm. In 1519 he was appointed professor at Ingolstadt; in 1521 the plague drove him to Stuttgart. During a great part of his life Reuchlin was the real center of all Greek and Hebrew teaching in Germany. Several of his works had considerable pop-

Reuling

ularity in their time. He sympathized deeply with Luther and the Reformation, but maintained his connection with the Roman Catholic Church to the last. He died near Hirschau, Bavaria, June 30, 1522.

Reuling, George, an American ophthalmologist; born in Romrod, Germany, Nov. 14, 1839; was surgeon in the Prussian army during the war with Austria; assistant surgeon in the Eye Hospital in Wiesbaden, in 1866-1867; studied in Paris and later in Baltimore and became physician-in-chief of the Eye and Ear Infirmary in Baltimore in 1869. He was Professor of Ophthalmology in the University of Baltimore; Professor of Eye and Ear Surgery in Washington University, Baltimore, Md.; and Professor of Eye and Ear Disease in the Baltimore Medical College after 1886. He was a fellow of the Heidelberg Ophthalmological and the American Laryngological and Otological Societies; eye and ear surgeon at the Maryland General Hospital; the Maryland Home for the Aged, and for the Baltimore and Ohio Railroad. He was the author of many technical papers on, and has invented apparatus for, eye and ear surgery.

Reumont, Alfred von, a German historian; born in Aix-la-Chapelle, Prussia, Aug. 15, 1808; was educated at Bonn and Heidelberg, and entered the Prussian diplomatic service, filling posts at Florence, Constantinople, and Rome. From 1851 till 1860, when he retired to private life, he was successively Prussian minister at Florence, Modena, and Parma. He was the author of several valuable works on the history of Italy, including "Contributions to Italian History," "The Carafas of Maddaloni," "History of the City of Rome," etc. He also wrote on the history of art. He died near Aix-la-Chapelle, April 27, 1887.

Réunion, formerly BOURBON, an island in the Indian Ocean, between Mauritius and Madagascar, 115 miles from each; area, 970 square miles; pop. (1907) 177,677—15,219 being British Indians, 4,496 natives of Madagascar, 9,848 Africans and 836 Chinese. It was annexed by France in 1643, and is an important French colony, now sending a representative to the chamber of deputies, and forming practically almost a department of France. It is very mountainous, the Piton des Neiges reaching a height of 10,069 feet, and the Piton de la Fournaise, an active volcano, of 8,294 feet. The soil produces tropical products, sugar being the principal crop. Coffee, cloves, and vanilla are also grown. Destructive hurricanes are frequent. There are no natural harbors, but an artificial harbor has been constructed at Pointe des Galets, at the N. W. side of the island; and this harbor is connected by railway with St. Denis

Reuss

(the capital), and all the principal places on the coast

Reus, a town of Spain; 58 miles S. W. of Barcelona and 4 N. of its seaport, Salou. The prosperity of the place dates from about 1750, when a number of English merchants settled there. It is a busy center of the cotton, silk, and silk ribbon industries, prepares wine, and manufactures soap, brandy, and leather.

Reuss, a tributary of the Aar in Switzerland, rising on the N. face of the St. Gothard, flowing N. past Andermatt and Ams- teg, between which places its bed lies at the bottom of a wild and narrow gorge, spanned by the Devil's Bridge and other wonders of Swiss roadmaking, and entering the S. end of the Lake of Lucerne. This it leaves again at its N. end, at the town of Lucerne, and, still going nearly due N., reaches the Aar near Windisch (Aargau). Its length is 90 miles; its basin, 1,317 square miles.

Reuss, the name of two sovereign principalities of Germany; between the kingdom of Saxony on the E., the Prussian duchy of that name on the N., and Bavaria on the S. Since 1666 the possessions of the House of Reuss have been divided between the Elder and the Younger lines. The principality of Reuss-Greiz (the Elder Line) is 122 square miles in extent, and had (in 1905) 70,603 inhabitants. The chief town is Greiz. The principality of the Younger Line is Reuss-Schleiz-Gera. Area, 319 square miles; pop. (1905) 144,584. Capital, Schleiz. Of both principalities the surface is hilly, being traversed by the Frankenwald (Thüringer Wald), whose summits reach upward of 2,000 feet in height. The chief rivers are the Saale and the White Elster, the valleys of which are well cultivated. More than a third of each state is covered with forests; cattle are fattened on the extensive meadows; and woolen, cotton, and silk goods are woven. The reigning prince of each state is a hereditary sovereign, and in each state always bears the name of Heinrich. He is the executive. Reuss-Greiz has a legislative assembly of 12 members, of whom nine are chosen by the people for six years; Reuss-Schleiz-Gera has an assembly of 16 members, of whom 12 are chosen for three years by the people.

Reuss, Eduard, a German theologian; born in Strasburg, Alsace-Lorraine, July 18, 1804. He first studied philology at Strasburg, then theology there, at Göttingen, and at Halle, and Oriental languages at Paris under Silvestre de Sacy; next qualified as privat docent in the theological faculty at Strasburg, and filled a chair as ordinary professor in 1836-1838, and again after the reestablishment of the university in 1872-1888. His chief works are "History of the Sacred Scriptures of the New

Testament" (1842; 6th ed. 1887; Eng. trans. 1884); "History of the Sacred Scriptures of the Old Testament" (1881); and "History of Christian Theology in the Apostolic Age" (1852; 3d ed. 1864; Eng. trans. 1872); "History of the Canon of the Sacred Scriptures" (1862; Eng. trans. Edin. 1884); and "The Bible, New Translation with Commentary" (19 vols. 1877-1879). With Baum and Cunitz he commenced in 1863 the publication of a monumental edition of Calvin's works (44 vols. up to his death). He died in Strasburg, April 15, 1891.

Reuter, Fritz, a German humorist; born in Stavenhagen, Mecklenburg-Schwerin, Nov. 7, 1810; was educated at Rostock and Jena. He became an active member of the student society "Germania," which cost him seven years' imprisonment in Prussian fortresses. Returning home in 1840 he supported himself first by farming, then by teaching, and finally by literary work. His first literary venture was a volume of humorous poems in Low German (1853), which met with extraordinary success. His greatest work is a series of prose tales, which stamped him as the greatest writer of Plattdeutsch and one of the greatest humorists of the century. He died in Eisenach, June 12, 1874.

Reuter, Paul Julius, Baron, a German-English news agent, at one time well known from the familiar newspaper heading "Reuter's Telegram"; born in Cassel, July 21, 1821. In Aix-la-Chapelle he formed in 1849 an organization for collecting (partly by pigeon post) and transmitting by telegraph commercial and financial news; and in 1851 he transferred his headquarters to London. As telegraphs extended throughout the world he multiplied the ramifications of his system till it embraced the remotest regions. He even maintained couriers where the telegraphs did not reach — *e. g.*, between Peking and Kiachta. In 1865 Reuter converted his business into a limited liability company, and in 1871 he was made a baron of Germany. In 1872 the Shah of Persia gave him the sole right of making railways, working mines, forests, etc.—a monopoly never made effective, and annulled in 1889, when the concession of the Imperial Bank of Persia was conferred on him. He died Feb. 22, 1899.

Reuterdahl, Henry, an American naval artist; born in Malmo, Sweden, Aug. 12, 1871; received an academic education at Stockholm, Sweden; served as correspondent during the American-Spanish War; contributed to "Harper's," the "Century," "St. Nicholas," "McClure's," the London "Graphic" and other magazines; and in 1902 was engaged in painting a series of pictures of the navies of the world.

Reutlingen, a town of Würtemberg; 8 miles E. by S. of Tübingen and 20 S. of Stuttgart. Many of its houses are old and picturesque. The Church of St. Mary (1247-1343), with a tower 243 feet high, is a noble Gothic edifice. Woolen and cotton yarns are spun, and cloth, leather, cutlery, hosiery, paper, etc. are manufactured. Reutlingen was formerly a free imperial town and a member of the Suabian League; it came to Würtemberg in 1802. Pop. (1905) 23,703.

Revaccination, the process of repeating primary vaccination at about the age of puberty, and again perhaps in the course of life if smallpox is prevalent. Several of the European powers have appointed at various times medical commissioners to determine the best time and method of performing revaccination. Varying opinions resulted. Thus 14 years is the age recognized by the English government for revaccination, but the German commission recommended 10 or at the latest 12 years as the age for revaccination, and the lymph ought to be calf-lymph. Many eminent authorities have shown that revaccination practically abolishes smallpox. See VACCINATION.

Reval, or **Revel**, a Russian seaport; capital of Esthonia; on a small bay on the S. side of the Gulf of Finland, opposite Helsingfors (52 miles distant), and 232 miles W. S. W. of St. Petersburg. It is divided into the (old) upper and (new) lower towns. The former contains the cathedral, the castle, governor's residence, and the houses of the (German) nobility. The new town extends outside the city walls. There are several mediæval guild houses, in some of which are preserved valuable archives, and an important museum of antiquities. Reval exports cereals (chiefly oats), spirits, flax, and other commodities to the value of more than \$12,500,000; and imports cotton, coal, and other goods to the value of \$32,500,000. There is little industry, brandy, vinegar, and wool being manufactured to a small extent. Pop. (1897) 64,578, of whom more than one-half were Esthonians, and nearly one-fourth of German descent. Reval was founded by Waldemar II. of Denmark in 1219, and became a flourishing Hanse town. It was long held (from 1346) by the Livonian Knights, was made over to Sweden in 1561, and was besieged by Peter the Great and annexed to the Russian empire in 1710. In 1713 a naval harbor was founded.

Reveillé, the signal given in garrisons at break of day, by beat of drum or sound of bugle, for the soldiers to rise and the sentinels to forbear challenging until the retreat is sounded in the evening.

Reve Land

Reve Land, in Old English law, such land, as having reverted to the king after the death of his thane, who had it for life, was not afterward granted out to any by the king, but remained in charge, upon the account of the reeve or bailiff of the manor.

Revelation, the act of revealing, disclosing, or making known that which is secret, private, or unknown; disclosure. Specifically, the act of revealing or communicating divine truth. Also that which is revealed, disclosed, or made known; specifically, the Bible.

Revelation of St. John, the last book of the New Testament, and the only distinctively prophetic one given to fling back the veil which hides futurity from the view. Its writer was John (i. 4, xxii: 8), the servant of God (i: 1), the "brother" and "companion in tribulation" of the then persecuted Christians, himself an exile in Patmos, "for the word of God and for the testimony of Jesus Christ" (i: 9). It was there he saw the prophetic visions, narrating them after he left the island. The majority of the Fathers and the Church of the Middle Ages considered, as do most modern Christians, that the author was John the Apostle; though Dionysius of Alexandria, and some others among the ancients, believed him to have been a certain John the Presbyter (mentioned by Papias, Dionysius, Eusebius, and Jerome), whose tomb, like that of the apostle, was said to be at Ephesus. Finally, Beza hinted, and Hitzig more confidently asserted, that the work emanated from John Mark, author of the second Gospel, with whose style that of the Revelation was said partly to agree. Many modern critics have rejected the hypothesis that John the Apostle was the author of the Revelation, stating that the Greek of the latter book is deeply tinged with Hebraisms, while that of the Gospel is much more classic. Among those who accept the apostolic authorship of the work, two views are current as to its date. The prevailing one is, that the visions in Patmos were seen in A. D. 96, and the work penned in that year or in 97, the reigning emperor being Domitian. The other view is, that it was penned about A. D. 68 or 69. Ch. xvii: 10 is interpreted to mean that five Roman emperors had reigned and died, viz., Augustus, Tiberius, Caligula, Claudius, Nero, "one is," *i. e.*, Galba or if Julius Cæsar be considered the 1st emperor, then the "one" is Nero. Respecting the canonicity of this book, it was alluded to or quoted in Hermas, Papias, Melito, Justin Martyr, the fragment published by Muratori, Theophilus of Antioch, Apollonius of Ephesus, Irenæus, Hippolytus, Tertullian, Clement of Alexandria, Origen, Jerome, etc. It was not in the Old Syrian version, though some Greeks accepted it. The Cerinthians, Caius

Reverberatory Furnace

of Rome, and others rejected it. Luther, Carlstadt, and Zwingli spoke of it disparagingly, but it is accepted by the Churches of the Reformation, as well as by the Roman Church. The "Son of Man (i: 13), who died and lives again forevermore, and has the keys of hell and death" (17, 18), appears in the first vision, and commissions the apostle to write to the seven churches of Asia (ii., iii.). A manifestation of the divine glory is seen (iv.), and the "Lamb who was slain," "the Lion of the tribe of Judah," having opened a book with seven seals, seven visions corresponding to the seven seals are witnessed (vi.). To the seals succeed seven trumpets (viii., ix.), afterward a woman persecuted by a dragon (xii.), and two beasts, which rise, one from the sea, the other from the earth, are exhibited (xiii.). Those sealed by the Lamb appear in blessedness (xiv.), seven vials of wrath are poured out (xv., xvi.), the mystic Babylon is destroyed (xvii.-xix.), millennial glory follows (xxi: 1-6), and after a brief apostasy (7-10), the last judgment takes place (11-15), the New Jerusalem descends (xxi.), and unalloyed felicity arises to those who have been faithful to the end (xxii.). Three schemes of interpretation exist: The Preterist, which makes the events predicted now wholly passed; the Futurist, which regards them as future, and that of a third and numerous school, who regard the visions as a historical or continuous prediction of the whole history of the Church from apostolic times to the consummation of all things.

Revels, Master of the, an English officer in former times appointed to superintend the revels or amusements, consisting of dancing, masking, etc., in the courts of princes, the inns of court, and noblemen's houses, during the 12 Christmas holidays. He was a court official from the time of Henry VIII. to that of George III.

Revenue, the income of a nation derived from taxes, duties, and other sources, for public uses. See articles on the different countries.

Revenue Cutter, a small armed steam vessel, designed for the prevention of smuggling; so called from the fact that originally the vessel was of the cutter-yacht type. The United States Revenue Cutter Service is a branch of the Treasury Department and its purpose is, principally, to enforce the customs revenue laws. Its immediate supervision resides in a bureau of the department known as the Division of Revenue Cutter Service, which is in charge of a chief and a number of assistants.

Reverberatory Furnace, a furnace in which ore, metal, or other material is exposed to the action of flame, but not to the contact of burning fuel. The flame passes

Revere

over a bridge and then downward on the material, which is spread on the hearth. The reverberatory furnace for copper has a furnace chamber, hearth, two tuyeres, and two cisterns, into which the molten results of the process are discharged.

Revere, Joseph Warren, an American military officer; born in Boston, Mass., May 17, 1812; was appointed a midshipman in the navy in 1828; became a past midshipman in 1834; lieutenant in 1841; took part in the Mexican War; and resigned from the navy in 1850. He served in the Civil War as colonel of the 7th New Jersey Volunteers and afterward as Brigadier-General. He had command of a brigade at Fredericksburg; was transferred to the command of the famous "Excelsior Brigade," with which he fought at Chancellorsville. He was censured by his superior officer after the engagement at Chancellorsville; was tried by court-martial, and was dismissed from the service in 1863; but his dismissal was revoked by President Lincoln, and his resignation accepted. He wrote "Keel and Saddle," in which he relates many of his personal adventures. He died in Hoboken, N. J., April 20, 1880.

Revere, Paul, an American patriot, famous for his midnight ride from Boston to Lexington; born in Boston, Mass., Jan. 1, 1735. He was the son of a goldsmith from Guernsey, whose trade he followed after serving as a lieutenant of artillery in the expedition against Crown Point (1756). He also engaged in copperplate printing, and before the Revolution constructed a gunpowder mill. A keen patriot, he was one of the party that destroyed the tea in Boston harbor, and he was at the head of a volunteer committee, consisting of 30 young mechanics, who formed a secret society to watch the British. When it was known that the latter intended to move, Revere crossed over to Charlestown, and April 18, 1775, the night before Lexington and Concord, at a signal rode on to Lexington and to Lincoln, rousing the minute-men as he went; at Lincoln he was stopped, but a companion succeeded in reaching Concord. His ride is the subject of a well-known poem by Longfellow. During the war he rose to lieutenant-colonel of artillery; afterward he returned to his goldsmith's work, and in 1801 founded the Revere Copper Company at Canton, Mass. He died in Boston, May 10, 1818.

Reverend, worthy or deserving of reverence; entitled to reverence or respect; enforcing reverence by the appearance (applied to persons and things). Also a title of respect given to clergymen and ecclesiastics. In England a dean is addressed as very reverend, a bishop as right reverend, and an archbishop as most reverend. In

Revetment

Catholic countries the religious in orders are addressed as reverend fathers; abbesses, prioresses, etc., as reverend mothers. In Scotland the principals of universities, if clergymen, and the moderator of the General Assembly for the time being, are styled very reverend, and each of the ministers, reverend. All ministers of religion in the United States, Great Britain, and the British colonies are given this title. In 1874 the Bishop of Lincoln, England, refused to allow "Rev." to be put on the tombstone of a Wesleyan preacher, and gained his case in the Court of Arches in 1875, but the Privy Council, on appeal (Jan. 21, 1876), reversed the decision, and declared the title to be simply complimentary, and not confined to clergymen of the English Establishment.

Reverse, in numismatics, the side of a medal or coin opposite to that on which the head or principal figure is impressed. The latter is called the obverse.

Reversion, a right or hope to future possession or enjoyment; right of succession; succession. Also a reversionary or deferred annuity, *i. e.*, an annuity which does not begin to be paid at once, but at a certain future day. In biology, the tendency of an animal or a plant to revert to long-lost characters. Darwin contends that it is by no means so potent as is generally believed. It is easy to breed cart or race-horses, long and short-horned cattle, and esculent vegetables without their reverting to the characters of the aboriginal stock. He also believes that reversionary and analogous characters can be easily confounded. In the "Descent of Man" he gives more prominence to reversion, showing that seven abnormal variations of muscles in man resemble the typical ones in apes, and dark-colored stripes suddenly reappear on the legs and shoulders of horses, asses, and mules, derived, he believes from a striped ancestor hundreds, if not even thousands of generations ago.

In law, the returning of an estate to the grantor or his heirs after a particular estate is ended. An estate in reversion is the residue of an estate left in the grantor, to commence in possession after the determination of some particular estate granted out by him. The term is sometimes improperly extended to any future estate in reversion or remainder. Reversion of series, in mathematics, when one quantity is expressed in terms of another, by means of a series, the operation of finding the value of the second in terms of the first, by means of a series, is called the reversion of the series.

Revetment, in fortification, a facing to a wall or bank, as of a scarp or parapet. The material depends upon the character of the work. In permanent works it is usually

Review

of masonry; in field works it may be of sods, gabions, timber, hurdles, rails, or stones. In civil engineering, a retaining or breast wall at the foot or on the face of a slope.

Review, a critical notice or examination of a new publication; a criticism, a critique. Hence a name given to certain periodical publications containing a collection of critical essays on subjects of public interest, literary, scientific, political, moral, or theological, together with critical examinations of new publications; as the "North American Review," the "Edinburgh Review." The first review is said to have been the "Journal des Scavans" (Journal of the Learned), first published in Paris in 1665; the first British one was the "Monthly Review," which began in 1749; the great Whig organ, the "Edinburgh Review," commenced in 1802, and in 1809, called into existence as an antagonist the "Quarterly Review," the mouth-piece of Conservatism. Of other important reviews the "Athenæum" dates from 1828, the "Dublin Review" from 1836, the "North British" and the "British Quarterly" from 1844, the "Saturday" from 1855, the "Fortnightly" from 1865, the "Contemporary Review" from 1866, and the "Academy" from 1869. Among the principal American reviews are the "Princeton Review," of Princeton, New Jersey; the "American Catholic Quarterly," of Philadelphia; the "North American," of New York; the "Methodist" (bimonthly), of New York; the "Educational" of New York; the "Presbyterian Quarterly," of Richmond, Va., and the "Review of Reviews," of New York and London.

In law, the revision of any interlocutor, decree, or sentence, against which a person has reclaimed or appealed; the power which a superior court has of reviewing the judgment of an inferior court.

Réville, Albert, a French theologian; born in Dieppe, France, Nov. 4, 1826. He studied at Geneva and Strassburg, and was pastor of the Walloon Church at Rotterdam in 1851-1872. Then he lived near Dieppe till his call in 1880 to the chair of the history of religions in the College of France. His numerous books include "Comparative History of Philosophy and Religion" based on Scholten (1859; Eng. trans. 1864); "Redemption" (1860); "Essay on Religious Criticism" (1860); "Handbook of Religious Instruction" (1863); "History of the Dogma of the Divinity of Jesus Christ" (1869; Eng. trans. 1870); "Introduction to the History of Religions" (1881; Eng. trans. 1884); "The Native Religions of Mexico and Peru" (the Hibbert Lectures for 1884); "Religions of Uncivilized Peoples" (1883); and "The Chinese Religion" (1889).

Revival

Révillon, Antoine, or **Tony**, a French novelist and journalist; born in St. Laurent-les-Mâcon, Ain, France, Dec. 29, 1832. He contributed to many periodicals, and published: "The Happy Youth of F. Lapalud" (1866); "The Separated One" (1875); etc.

Revise, among printers, a second or third proof of a sheet to be printed, taken off in order to be compared with the last proof, to see whether all the mistakes marked in it are actually corrected.

Revised Version, a revised edition of the Authorized Version of the Bible. The resolution to undertake it was come to by the Convocation of Canterbury in February and May, 1870, and various members were nominated to carry out the work. Coöperation was sought from scholars in the other churches and from an American committee. A better text was constructed, manuscripts being used which had been discovered since the Authorized Version had been made. Revision, not retranslation, was aimed at, as few alterations as possible being introduced, and these only if adopted by the votes of two-thirds of the translators. It follows that a new rendering might commend itself to the majority of them, and yet be relegated to the margin, while that which had only a minority of votes was left in the text. The headings of chapters and pages, paragraphs, italics, and punctuation were to be revised, and finally the headings were omitted. Poetry was printed in lines, showing the rhythm. The New Testament was published in May, 1881, the Old in May, 1885. Each had an immediate and large sale, but the Authorized Version still holds its place in most churches.

Revival, the act of reviving; the state of being revived; most commonly used in a religious sense. Revivals occur in all religions. When one takes place a large number of persons who have been comparatively dead or indifferent to spiritual considerations, simultaneously or in quick succession become alive to their importance, alter spiritually and morally, and act with exceeding zeal in converting others to their views. A Mohammedan revival takes the form of a return to the strict doctrines of the Koran, and a desire to propagate them by the sword. A Christian minority living in the place is in danger of being massacred by the revivalists.

Christian Revivals.—Pentecostal effusion of the Holy Spirit (Acts ii) produced a revival within the infant Church, followed by numerous conversions from outside. Revivals, though not called by that name, occurred at intervals from apostolic times till the Reformation, the revivalists being sometimes so unsympathetically treated that they left the Church and formed sects,

Revival of Letters

while in other cases, and notably in those of the founders of the monastic orders, they were retained and acted on the Church as a whole. The spiritual impulse which led to the Reformation, and the antagonistic one which produced or attended the rise of the Society of Jesus, were both revivalist. It is, however, to sudden increase of spiritual activity within the Protestant churches of the English-speaking peoples that the term revival is chiefly confined. The enterprise of the Wesleys and of Whitefield in this country and England from 1738 onward was thoroughly revivalist. There were revivals at Northampton, in Massachusetts, in 1734, and throughout New England in 1740-1741, the Rev. Jonathan Edwards being the chief instrument in their production. A great one arose in America in 1857, after the financial crisis of that year. It spread in 1859 to Ireland, and in 1864 to Scotland and to parts of England. Since then various revivals have from time to time occurred, and nearly all denominations aim at their production. The means adopted are prayer for the Holy Spirit, meetings continued night after night, often to a late hour, stirring addresses, chiefly from revivalist laymen, and after-meetings to deal with those impressed. Ultimately, it is found that some of those apparently converted have been steadfast, others have fallen back, while deadness proportioned to the previous excitement temporarily prevails. Sometimes excitable persons at revival meetings utter piercing cries, or even fall prostrate. These morbid manifestations are now discouraged, and have in consequence become more rare. One of the most remarkable movements of modern times, properly coming under the head of a revival, is that of the SALVATION ARMY (*q. v.*), founded by the Rev. William Booth, a Methodist minister of Nottingham, England. This movement has been recognized since 1880, as a distinct sect, and with its essential military organization has become an immense power among the poorer classes both in this country and in Europe. In the United States the commander, Ballington Booth, withdrew from the Salvation Army and organized the Volunteers of America.

Revival of Letters, the revival of literature after the apparent death-blow which it received when the barbarous nations of the North destroyed the civilized Roman empire. It commenced in England feebly at the beginning of the 11th century, and became more potent in the 14th, 15th and subsequent centuries.

Revivor, in law, the reviving of a suit which is abated by the death of one of the parties, by the marriage of a female plaintiff, or for some other cause.

Revocation, in law, the destroying or annulling of a deed or will which had exist-

Revolution

ence till the act of revocation made it void. The revocation of a deed can only be effected when an express stipulation has been made in the deed itself reserving this power. The revocation of a will can be made in four different ways: (1) by another will; (2) by intentional burning, or the like; (3) by the disposition of the property by the testator in his lifetime; (4) by marriage.

Revocation of the Edict of Nantes. See EDICT OF NANTES.

Révoil, Benedict Henri, a French novelist and dramatist; born in Aix, Bouches-du-Rhône, France, Dec. 16, 1816. He lived in the United States for nine years, during which time he collected the material for many of his works. They include: "Hunting and Fishing of the Other World" (1856); "The Daughter of the Comanches" and "Dramas from the New World" (1864-1865), and a number of plays which he put on the stage in the United States, and afterward published in France.

Revolution, a fundamental change in government, or in the political constitution of a country, effected suddenly and violently, and mainly brought about by internal causes; a revolt against the constituted authority successfully and completely accomplished. In most revolutions there are three turns of the wheel. First there is a moderate movement forward, then, after a time, a second forward movement. The extreme party who now come into power create a reaction against the revolution, and the wheel moves backward. In the great French Revolution first there were the Girondists, then the Jacobins, then the reaction to monarchy under the first Napoleon, and in due time again to the Bourbons. In the United States the term Revolution is applied specifically to the American War for Independence, which began in 1775 with the irregular running fight popularly known as the battle of Lexington, and practically ended with the surrender of Lord Cornwallis, at Yorktown, Va., to the combined forces of the French and Americans, in the year 1781. By this war the colonies succeeded in casting off the English authority and in erecting the government of the United States. The English Revolution, that revolution in England by which James II. was driven from the throne in 1688.

In astronomy: (1) The motion of a planet around the sun, or of a satellite around a planet. The point to which it returns is called annual, anomalistic, nodical, sidereal, or tropical, according as it has a relation to the year, the anomaly, the nodes, the stars, or the tropics. (2) See ROTATION. In geometry, when one line moves about a straight line, called the axis, in such a manner that every point of the moving

line generates a circumference of a circle, whose plane is perpendicular to the axis, that motion is called revolution, and the surface is called the surface of revolution. Every plane through the axis is called a meridian plane, and the section which this plane cuts from the surface is called a meridian curve. Every surface of revolution can be generated by revolving one of its meridian curves about the axis. The revolution of an ellipse round its axis generates an ellipsoid; the revolution of a semicircle round the diameter generates a sphere; such solids are called solids of revolution.

Revolutionary Calendar, a calendar designed to be philosophic, decreed on Nov. 24, 1793, to commence from the foundation of the French republic, Sept. 22, 1792. The 12 months were Vendémiaire, Brumaire, Frimaire, Nivose, Pluviose, Ventose, Germinal, Floréal, Prairial, Messidor, Fructidor or Thermidor, and Fructidor. The first three constituted Autumn, the second three Winter, the third Spring, and the fourth three Summer.

Revolutionary Tribunal, in French history, the name given on Oct. 30, 1793, to what had before been called the Extraordinary Tribunal. It sent many victims to the guillotine.

Revolver, a description of firearm in which a number of charges contained in a revolving cylinder are, by pulling the trigger, brought successively into position and fired through a single barrel. For the introduction of the revolver in its present form we are indebted to Col. Samuel Colt, of Hartford, Conn., though repeating pistols had long been known in other countries. These were made from one mass of metal bored into the requisite number of barrels, but were so clumsy as to be almost quite useless. In the Colt revolver there is a revolving cylinder containing six chambers placed at the base of the barrel, each chamber having at its rear end a nipple for a cap. These contain the cartridges, which are put in from the front of the breech-piece and driven home by a lever ramrod placed in a socket beneath the barrel. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, till each chamber in succession is brought round so as to form virtually a continuation of the barrel. Various modifications of Colt's revolver have been introduced, with the view in some cases of increasing the rapidity and facility of firing, in others of diminishing by safeguards the risks to which inexperienced hands must ever be exposed in the use of these weapons. In the Smith and Wesson revolver, (adopted by Austria and Russia), facility in loading is a feature, the

cylinder and barrel together being pivoted to the front of the stock, so that by setting the hammer at half-cock, raising a spring-catch, and lowering the muzzle, the bottom of the cylinder is turned up to receive fresh metallic cartridges. When this is done the muzzle is pressed back till the snap-catch fastens it to the back plate, and the revolver is again ready to be fired. In the latest form of this revolver the spent cartridges are thrown out of the cylinder by means of an automatic discharger. The British regulation army revolver is Webley's modified Smith and Wesson, which chiefly differs from the original in the method of securing the hinged barrel and revolving chambers to the standing breech and stock of the pistol. The mode adopted permits of very rapid loading, and when fired off the empty cases are automatically ejected. The weapon can also be easily and instantly unloaded, and some are made with covered hammers, safety-bolts, and of small caliber for the pocket. As a military weapon the revolver will, it is thought, be superseded by a repeating pistol with mechanism similar to that of magazine rifles. The revolver principle has also been applied to rifles, and to guns for throwing small projectiles, as in the Gatling and other machine guns. See **AUTOMATIC PISTOL: FIREARM**.

Revolving Furnace, a furnace with a rotary motion, used in some chemical manufactures and in the manufacture of malleable iron. The revolving furnace has superseded the reverberatory furnace in many processes.

Revolving Light, one character of light as displayed from a lighthouse. It is produced by the revolution of a frame with three or four sides, having reflectors of a larger size than those used for a fixed light, the group on each side with their axes parallel. The revolution exhibits once in one or two minutes, as may be required, a light gradually increasing to full strength, and then decreasing to total darkness.

Rewa, a State of India, called also **BAGHELKHAND** (*q. v.*). **REWA KANTHA** is the name of a political agency under the government of Bombay, containing 61 small states, of which five are tributary to the British government, and most of the remainder to Baroda. The territory included, covering an area of 4,792 miles, with a total pop. of 543,452, lies mainly along the S. bank of the lower Nerbudda with patches N. of it, and on the W. borders on Broach, Baroda, and Ahmadabad.

Reward, in a legal sense, some encouragement which the law holds out for exertions in bringing certain classes of criminals to justice. The courts of assize may order the sheriff of the county, in which certain offenses have been committed, to pay to per-

Rexford

sons who have been active in securing the apprehension of offenders charged with murder, or with feloniously shooting, cutting, stabbing, wounding, or poisoning, or with rape, burglary, housebreaking, robbery, arson, or cattle stealing or with being accessory before the fact to any of such offenses, or to receiving any stolen property, a reasonable sum to compensate them for expense, exertion, and loss of time. So by a later statute courts of quarter sessions are authorized, in the case of any of the above offenses which they have jurisdiction to try, to order such compensation; but the payment to one person must not exceed \$25. If any one is killed in endeavoring to apprehend a person charged with one of these offenses, the court may order compensation to be made to the family. The amount to be paid in all such cases is subject to regulations which may be made from time to time by the Secretary of State. By another statute it is a felony, punishable by penal servitude to the extent of seven years, to corruptly take any reward for helping a person to property stolen or embezzled, unless all due diligence to bring the offenders to trial has been used. In Great Britain an advertisement offering a reward for the return of stolen or lost property, using words purporting that no questions will be asked or inquiry made after the person producing the property, renders the advertiser, printer, and publisher liable to forfeit \$250. For several years the offering of rewards by the government has in England been discontinued on grounds of public policy. For example, during the series of murders in Whitechapel in 1888-1890, the Home Office, though urgently requested to offer a reward for the discovery of the criminal, steadily refused to do so.

Rexford, Eben Eugene, an American poet; born in Johnsburg, N. Y., July 16, 1848. He began to write when a mere child, contributing to periodicals and magazines. He published in book form the poems "Brother and Lover" and "Grandmother's Garden" (1887); and a story, "John Fielding and his Enemy" (1888). "The Swamp Secret" (1897); "Into the Light" (1899), etc. He wrote the popular songs "Silver Threads Among the Gold" and "Only a Pansy-Blossom."

Rex Insula. See RÉ, ILE DE.

Rewari, a town of the district of Gurgaon, in the extreme S. of the Punjab, 50 miles S. W. of Delhi, an important center for trade between Punjab and Rajputana. Pop. 23,900.

Reybaud, Marie Roch Louis, a French writer; born in Marseilles, Aug. 15, 1799; traveled in the Levant and India, and returned to Paris in 1829 to write for the Radical papers and edit the "Scientific and

Reynard the Fox

Military History of the French Egyptian Expedition"; Dumont d'Urville's "Journey Round the World" (1833), and Orbigny's "Journey in North and South America" (1836). His studies in social science bore fruit as "Studies of the Reformers, or Modern Socialists" (2 vols. 1840-1843; 7th ed. 1864), which gained him the Montyon prize (1841) and a place in the Academy of Moral Sciences (1850). His unusually original satiric novel, "Jérôme Paturot in Search of a Social Position" (1843), became widely popular, and was followed by the less successful "Jérôme Paturot in Search of the Best of the Republics" (1848). Reybaud took an active part in politics, first voted with the Left, but after the July revolution with the Right, and was sent by the Assembly to Algeria to visit the agricultural colonies established there. His last 30 years were devoted to studies in economics. From 1850 a member of the Academy, he died at Paris Oct. 28, 1879. Among his later works were "Navies and Journeys" (1854); "Scenes from Modern Life" (1855); "Industry in Europe" (1856); and "Studies in the Management of Manufactures" (1859).

Reyburn, Robert, a Scotch-American physician; born in Glasgow, Scotland, Aug. 1, 1833; was graduated at the Philadelphia College of Medicine in 1856 and practised his profession in that city till 1862, when he entered the United States army as an acting assistant surgeon; later became surgeon and brevet lieutenant-colonel U. S. V., and assistant surgeon U. S. A. in 1867; and afterward practised in Washington. He was one of the surgeons in attendance on President Garfield; and was Professor of Physiology and Hygiene in the Medical Department of Howard University. He was a member of many scientific societies, author of "Clinical History of the Case of President Garfield"; and a contributor to medical journals. He died in 1909.

Reynard the Fox, the title of a well-known popular epic, the characters of which are animals instead of men. It belongs to the series of beast fables which have delighted the popular imagination from early ages and in all lands, from India to the Bushmen's country in South Africa. The stories that relate to the knaveries of Reynard the Fox seem to have originated for the most part in Northern France and Flanders from the 10th century onward, and to have been composed and recomposed repeatedly in various forms in the 12th and following centuries. The authors or editors, so far as they are known, belonged chiefly to the ecclesiastical orders. The several versions differ not only in respect of language and of style, but also in the choice and arrangement of the episodes and incidents narrated. All turn on the knaveries

of Reynard the Fox, as practised by him in his quarrel with Isengrim the Wolf, who in all encounters generally comes off second best. The best versions, as the typical Flemish and Low German, reach a high level of literary excellence.

The episodes are woven together into a veritable epic; the versification is agreeable and easy; the characters are consistent and well-sustained; the contemporary manners, and the localities and circumstances, that make the background of the story are true and realistic; and the story is told without any other obvious purpose beyond that of affording honest amusement. These features do not, however, characterize all the versions; some have been clearly written for a satirical purpose, some are loosely-connected strings of ill-told adventures, others drag out a long and weary length through innumerable indifferent verses, while in others still the characters are simply men disguised as animals. The earliest versions were in Latin; but they seem to have been soon supplanted by French in the 12th century, and in their new dress the stories attained a much wider popularity. Since the beginning of the 16th century nearly all the editions printed can be traced back to one of two sources, a Flemish or a Low German, both of which, however, are based on French forms of the epic.

The task of tracing the connections between the numerous versions that exist in the different tongues is one of great complexity and difficulty. It will suffice here to enumerate the more important, with mention of one or more trustworthy recent editions. The best Latin version, "Isengrimus" (ed. by Mone as "Reinardus Vulpes," Stuttgart, 1832; and by Voigt, Halle, 1884), which possesses considerable literary merit, was written in Flanders about 1146-1148 by an unknown author. The "Isengrimus" printed in J. Grimm's "Reinhart Fuchs" (Berlin, 1834) is not an older, but a later and abbreviated, form of the same poem. The best French versions that survive were edited by Méon (4 vols. Paris, 1826), with a supplement by Chabaille (1835), and by Martin (4 vols. Strasburg, 1882-1888). They were written between the middle of the 13th and the middle of the 14th century, and run to enormous length, the separate cycles or groupings of the episodes being called "branches." Méon's work includes three cycles: (1) "Roman du Renart," apparently the work of three if not more authors, Pierre de St. Cloud, a priest of Lacroix in Brie, and a Norman priest Robert de Lison; (2) "Le Couronnement de Renart," attributed to Marie de France; and (3) "Renart le Nouvel," by Jacquemars Gielée of Lille, about 1290. The last two are transparent satires on certain of the monastic orders. There is a fourth cycle, a voluminous compilation or imitation by

a priest of the neighborhood of Troyes, made near the middle of the 14th century, and entitled "Le Renart Contrefait" (ed. F. Wolf, Vienna, 1861). The oldest extant High German version, "Reinhart Vuhs or Fuchs" (ed. Reissenberger, Halle, 1886), more usually called "Reineke Fuchs," was adapted by some one unknown, early in the 13th century, from a still older version, "Isengrimes Nôt," itself a translation made from old French sources about 1180 by an Alsatian, Heinrich der Glichesaere.

The Flemish version which has been the basis of most of the translations, continuations, and editions that have been made since the invention of printing is entitled "Reinaert de Vos" (ed. Martin, Paderborn, 1874). It was written by one William, but whether William de Matoc, William Utenhove, or more probably an unknown William, is uncertain, and dates apparently from the middle of the 13th century. The source upon which it is built is the nineteenth "branch" in the "Roman de Renart" (last in vol. i. of Méon). The test that has been almost exclusively used in the later translations, etc., is that of a second edition, deviating in some respects from William's own, notably in the infusion of a didactic, satirical tendency; the author of this second edition is not known. It was from a prose version of this second edition, published at Gouda in 1479, that Caxton made his translation of "The History of Reynard the Fox" (1481; reprinted Edin. 1884). On this same edition was based the Low German version, "Reinke de Vos" (ed. Prien, Halle, 1887), which has been more often translated perhaps than any other version. Who the Low German translator was is not known, in spite of the question having greatly exercised many specialists. The *editio princeps* of "Reinke" is that of Lübeck (1498), and next to it stands that of Rostock (1517). There are Danish (by A. H. Weigere, Lübeck, 1555), Swedish (Stockholm, 1621), and several other High and Low German editions, for which, however, see the bibliography prefixed to Prien's "Reinke." Nevertheless special mention must be made of Gottsched's High German prose version (1752) and Goethe's well-known High German poem, with Kaulbach's scarcely less known illustrations to the same. Popular High German translations are contained in Simrock's "Deutsche Volksbücher" (vol. i. 1845) and Marbach's "Volksbücher" (vols. xv.-xvii.).

The outline of the story, according to the Flemish "Reinaert," is as follows: Nobel the Lion, king of animals, was holding court one Easter-tide. All the animals, great and small, came and paid homage to him except Reynard the Fox. Several among them complained of the knaveries of Reynard, the loudest being Isengrim the Wolf, Reynard's old comrade and enemy. He was followed

Reynard the Fox

by Tibert the Cat and Pancer the Horse; but Grimbart the Badger spoke up for his uncle Reynard. Then came Chanticleer the Cock, bringing his dead daughter slain by Reynard. For this and his other misdeeds the Fox shall, it is resolved, be cited to appear before the Lion and be tried. Bruin the Bear is sent to summon him. Reynard received him with soft words, told him of some honey hidden in a split tree, and contrived to get Bruin caught fast in the cleft of the tree; there the peasants found him and nearly beat him to death, but at last he got away and went back to court. The next messenger sent was Tibert the Cat. Him, however, Reynard persuaded to catch mice in a place where a noose hung, in which the Cat got caught; and he too was terribly beaten before he got away. At last Grimbart the Badger offered to undertake the office of messenger; and he persuaded Reynard to go with him to court. On the way the Fox makes a sort of private confession of his rascalities and misdeeds to his relative the Badger, especially of the tricks he has played off on the Wolf. The animals again came forward with their accusations. Reynard defended himself, but was condemned to death. As he was about to be hanged on the gallows, he begged leave to make a public confession of his evil deeds. In the course of his speech he dropped a hint that he knew where an immense treasure was hidden, and then, at the Lion's request, tells all about it.

His father, old Reynard, and Isengrim the Wolf, and Bruin the Bear had conspired together to slay the Lion and make Bruin king in his stead; but he (Reynard) had stolen their treasure, with which they thought to hire soldiers, and had gone and hidden it. He could not suffer the noble Lion to be slain and the wicked Bear to be made king in his place. The Lion thereupon pardoned him, and caused Bruin and Isengrim to be seized and punished. But when he asked Reynard to go and show him where the treasure was, Reynard excused himself, saying he was under an oath to make a pilgrimage to Rome. The Lion then let him go; and Reynard, taking with him Cuwaert the Hare, and Belin the Ram, set out on his pilgrimage. On the way he passed his own home, and induced Cuwaert to go into the house with him, and there killed him. And he put his head in a satchel (made from the skin of the Bear) and gave it to Belin, and bade him carry it back to the Lion, telling him it contained valuable letters. When the Lion saw Cuwaert's head he was exceeding wroth, and bade them let the Wolf and the Bear go free out of prison; and he gave the Ram into their power, and decreed Reynard to be an outlaw.

To this the Low German version adds a continuation, partly a repetition of the same incidents under disguise and partly an act-

ual continuation of the story, ending in a single combat between the Fox and the Wolf, in which the former by trickery beat his antagonist. Finally he returned to his own home, honored with the favor and protection of the Lion.

Reynolds, Dudley Sharpe, an American physician; born in Bowling Green, Ky., Aug. 31, 1842; was graduated at the Medical Department of the University of Louisville, in 1868; and became Professor of Ophthalmology, Otology, and Medical Jurisprudence in the Hospital College of Medicine, Louisville, in 1874. He was a member of many medical associations; and surgeon to the Louisville City Hospital in 1872-1902, and to the Chicago, Indianapolis and Louisville Railroad in 1894-1899.

Reynolds, Edwin, an American inventor; born in Mansfield, Conn., March 23, 1831; was educated in the public schools; entered a machine shop as apprentice in 1847, and became superintendent of the Corliss Steam Engine Company, at Providence, R. I., in 1861. Later he was made president of the Milwaukee Boiler Company, the Daisy Roller Mills Company, and the German American Bank. He was the inventor of the Reynolds-Corliss engine; introduced the first triple-expansion engine, the cross-compound hoisting engines for mining work, etc., and became superintendent of the Reliance Works at Milwaukee. He died Feb. 19, 1909.

Reynolds, Elmer Robert, an American ethnologist; born in Danville, N. Y., July 30, 1846; was educated at the Columbian University; served through the Civil War in the 10th Wisconsin Light Artillery; and in 1877 became an examiner of pensions in the United States Civil Service. He was engaged in exploring for aboriginal antiquities in Maryland and Virginia; was knighted by King Humbert of Italy in 1887; and wrote "Aboriginal Soapstone Quarries in the District of Columbia" (1878); "Cemeteries of the Piscataway Indians" (1880); "A Scientific Visit to the Caverns of Luray" (1880); "Memoir of the Pre-Columbian Shell Mounds at Newburg, Md., etc." (1886); etc. He died Sept. 18, 1907.

Reynolds, Frederic, an English dramatist; born in Lime Street, London, Nov. 1, 1764. His first piece, "Werter," founded on Goethe's novel, was produced in 1785; and later was reproduced many times, and printed both in London and Dublin. His second drama, "Eloisa," was played in 1786, when he abandoned tragedy for comedy. His first attempt, "The Dramatist" (1786), was very successful. He produced in all nearly 100 plays, a novel, and two autobiographical volumes. He died April 16, 1841.

Reynolds, John Fulton, an American military officer; born in Lancaster, Pa., Sept. 20, 1820; was graduated at the United

Reynolds

States Military Academy in 1841; as 1st lieutenant served in the Mexican War in 1846-1847; was promoted captain in 1855; and was appointed commandant at West Point in 1859. At the beginning of the Civil War he was appointed a lieutenant-colonel of volunteers; led a brigade in the Seven Days' battles, in June, 1862, near Richmond, when he so distinguished himself for skill and bravery that he was given the brevets of colonel and Brigadier-General, U. S. A. In 1863 he succeeded Hooker in command of the 1st Army Corps; in 1863 was promoted Major-General of volunteers. His corps was the vanguard at Gettysburg, where he was killed, July 1, 1863.

Reynolds, Joseph Jones, an American military officer; born in Flemingsburg, Ky., Jan. 4, 1822; was appointed to the United States Military Academy from Indiana in 1839; on graduation was appointed 2d lieutenant, 4th Artillery, and after service at Fort Monroe and in Texas was, in 1846, assigned to the 3d Artillery and was on frontier duty at Fort Washita, I. T., in 1855-1856; then became Professor of Mechanics and Engineering at Washington University, St. Louis, and was also stationed at other colleges. After the beginning of the Civil War he rapidly rose in rank from colonel of the 10th Indiana Volunteers to Major-General of volunteers; during that time he was in command of Camp Morton, Indianapolis, and Cheat Mountain district, W. Va. In Tennessee he was engaged in the actions at Hoover's Gap, battle of Chickamauga, and battle of Chattanooga; later was in command of the defenses of New Orleans from Jan. 6 to June 16, 1864; was in command of the 19th Army Corps, and assisted in organizing the forces for the capture of Mobile and Forts Gaines and Morgan, Mobile harbor, in the same year. He was in command of the Mississippi river from its mouth to Memphis, Tenn., from October to December, 1864; was mustered out of the volunteer service in 1866, and was promoted colonel in the regular army in the same year; was brevetted Brigadier-General in 1867 for gallant and meritorious service at the battle of Chickamauga, and was in the same year brevetted Major-General for similar service at the battle of Mission Ridge; after service in the 25th Infantry he was transferred to the 23d Cavalry in 1870, and after that time served at Fort McPherson and other military stations and on various boards till retired from active service June 25, 1877, for disability contracted in the line of duty. He died in Washington, D. C., Feb. 25, 1899.

Reynolds, Joseph Smith, an American lawyer; born in New Lenox, Ill., Dec. 3, 1839; was graduated at the University of Chicago in 1866; served through the Civil

Reynolds

War, participating in many battles. After the war was admitted to the bar; was a member of the Illinois Legislature in 1866-1870; one of the founders of the Chicago park system; member of the Chicago Board of Education in 1870-1874; State Senator in 1872-1874; commissioner from Illinois to the Vienna Exposition in 1873; commissioner to establish a State School for Feeble-Minded Children in 1875; senior vice-commander-in-chief of the G. A. R. 1875-1876; commander of the Illinois Department of the G. A. R. in 1877; and first vice-president of the Society of the Army of the Tennessee in 1877.

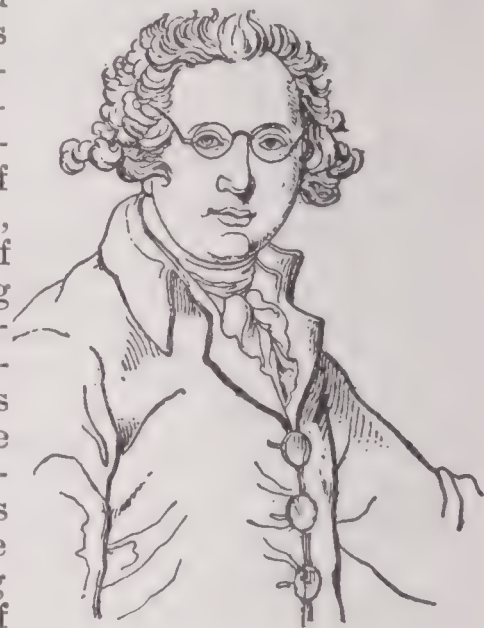
Reynolds, Sir Joshua, an English portrait and subject painter; born in Plympton Earls, near Plymouth, July 16, 1723. His father, a clergyman and master of Plympton grammar school, intended him for the medical profession; but he developed a strong aptitude for painting, was continually studying the plates in Cat's "Book of Emblems," Dryden's "Plutarch," and the other volumes that came in his way, and at the age of eight had mastered the "Jesuit's Perspective," and applied its principles to drawings executed by himself. In October, 1740, accordingly, he was sent to London to study art, and placed in the studio of Thomas Hudson, a portrait painter, of very moderate abilities, much employed at the time. In 1743 he returned to Devonshire, and some of the portraits of local worthies which he then produced still exist. In the following year he was again in London pursuing his art; but in the beginning of 1747, after the death of his father, he settled in Plymouth Dock, now Devonport, where he learned much from a study of the works of William Gandy of Exeter. In 1749 he made the acquaintance of Commodore, afterward Lord, Keppel, who invited him to accompany him on a cruise in the Mediterranean; and, after painting many of the British officers in Minorca, he made his way to Rome, where he studied Raphael and Michael Angelo, and in the Vatican caught a chill which permanently affected his hearing, and necessitated his use of an ear-trumpet during the rest of his life. He also visited Bologna, Genoa, Florence, Parma, and Venice. Returning to England in October, 1752, he soon afterward established himself in a studio in St. Martin's Lane, London, and attracted notice by his portraits of the second Duke of Devonshire and Commodore Keppel. Before long he was in excellent practice, and in the year 1755 he had no fewer than 120 sitters, of whom he produced portraits in which the influence of the Italian masters, and especially of Correggio, is clearly visible; works in which he was certainly aided by such assistants as Marchi, but which he impressed with his own character and individuality. He soon

removed to Great Newport Street; and finally, in 1760, he purchased a mansion on the W. side of Leicester Square, to which he added a studio and reception room.

He was now at the height of his fame, and a valued friend of his most celebrated contemporaries. In 1764 he founded the famous literary club of which Dr. Johnson, Garrick, Burke, Goldsmith, Boswell, and Sheridan were members; all of whom were portrayed by his brush. He was one of the earliest members of the Incorporated Society of Artists, and contributed to its exhibitions till 1768, when, on the establishment of the Royal Academy, he was elected its first president; and in the following year received the honor of knighthood from the king. In 1769 he delivered the first of his "Discourses" to the students of the Academy, 15 of which have been published. They are full of valuable and well-considered instruction, and, along with his papers on art in the "Idler," his annotations to Du Fresnoy's "Art of Painting," and his "Notes on the Art of the Low Countries" (the result of a visit to Belgium and Holland in 1781), show a correct and cultivated literary style. He contributed his picture of Miss Morris as "Hope nursing Love" to the first exhibition of the Royal Academy, along with his portraits of the Duchess of Manchester, Mrs. Blake, Mrs. Crewe, and Mrs. Bouverie; and in 1771 completed his subject of "Count Ugolino and his Children in the Dungeon," usually regarded as his most successful effort in the direction of historical art. In 1784 he succeeded Allan Ramsay as painter to the king; in the same year he finished and exhibited his portrait of Mrs. Siddons as the "Tragic Muse," in the possession of the Duke of Westminster, undoubtedly his greatest portrait, a work existing in several versions, of which one is in the Dulwich Gallery; and in 1787 he undertook three subjects for Boydell's Shakespeare Gallery, executing "Puck," "The Witch Scene from Macbeth," and "The Death of Cardinal Beaufort."

Hitherto he had devoted himself with little interruption to his art, having speedily recovered from a slight attack of paralysis from which he suffered in 1782; but in July, 1789, his sight became affected and he ceased to paint, though he was still able to enjoy intercourse with his friends. The following year was embittered by an unfortunate dispute with the Academy regarding the appointment of a professor of perspective, which led to his resignation of the presidency, a resolution which he afterward considered and rescinded; and on Dec. 10, 1790, he delivered his last "Discourse" to the students. Gradually his strength sank—for, unknown to his physicians, he was suffering from a painful form of liver complaint—and he peacefully expired on Feb. 23, 1792.

It is in virtue of his portraits that Reynolds ranks as the head of the English school of art. In the dignity of their style, the power and expressiveness of their handling, the variety and appropriateness of their attitudes, in the beauty of their coloring and the delicacy of their flesh-painting, his portraits have never been surpassed. He was at home alike in portraying the strength of manhood and the grace of the gentler sex; and his pictures of children have an especial tenderness and beauty which have given a world-wide celebrity to works like "Master Bunbury," "The Strawberry Girl," and "Simplicity." His efforts in the higher departments of historical and imaginative art were less successful, and too often these can be regarded only as among the failures of a great artist. In his technical methods Reynolds was unfortunately most careless and uncertain. He was continually experimenting in new processes and untried combinations of pigments, with the result that even in his own lifetime his works deteriorated, especially in their flesh-tints.



SIR JOSHUA REYNOLDS.

Personally Reynolds was a man of fine and varied culture, and he was distinguished by an exquisite urbanity, the expression of a most amiable and equable disposition, which was exceptionally fitted to win and retain friendship. His dignified gentleness, his mild reasonableness, tamed even the fierceness of Dr. Johnson; and there was more of truth than is usual in poetic panegyric in the lines of Goldsmith which speak of this painter as

Still born to improve us in every part,
His pencil our faces, his manners our heart.

The first great collection of the works of Reynolds was brought together by the British Institution in 1813, and numbered 142 pictures; another gathering was formed by the same body in 1823; 154 examples of his art were included in the South Kensington Portrait Exhibition of 1867; and 231 were exhibited in the Grosvenor Gallery in 1883-1884. His authentic works have been estimated by Taylor to number between 2,000 and 3,000; and from these some 700 engravings have been executed, some of them—such as the mezzotints of J. R. Smith, John Dixon, William

Dickinson, Valentine Green, and James M'Ardell—ranking among the finest examples of the art.

Reynolds, William, an American naval officer; born in Lancaster, Pa., Dec. 18, 1815; entered the navy in 1831; was commissioned lieutenant in 1841 and owing to broken health was retired in 1851. He was later sent to Hawaii, where he negotiated a reciprocity treaty. When the Civil War began he returned to active duty; was placed in command of the naval forces on the Asiatic Station in 1862; was promoted captain in 1866 and rear-admiral in December, 1873, and was retired on account of ill health in December, 1877. He died in Washington, D. C., Nov. 5, 1879. In announcing his death Richard M. Thompson, Secretary of the Navy, said: "In the administration of the duties committed to him, he did much to improve the personnel and efficiency of the enlisted men of the navy, and in the discharge of all the duties devolving on him, during a long career in the service, he exhibited zeal, intelligence, and ability, for all of which he was conspicuous."

Reze, Frederick, an American clergyman; born in Hildesheim, Germany, in 1797; fought in the battle of Waterloo; and soon afterward was ordained in the Roman Catholic Church and sent to Africa; and later came to the United States as secretary to Bishop Fenwick; returned to Germany in 1827 and sent many missionaries to the United States; again returned to the United States in 1828 and labored among the Indians of Ohio and Michigan; and on his departure for Germany was appointed vicar-general. In 1833 he was sent to Detroit, Mich., and was consecrated the first bishop of Michigan and Wisconsin. Bishop Reze was instrumental in founding the Leopoldine Society in Austria; and founded a college in Detroit; established academies there and in Green Bay, opened schools for education of the Indians. He resigned his see in 1837, and returned to Rome where he lived for several years. He died in Hildesheim, Germany, Dec. 27, 1871.

Rhabdomancy, divination by means of a rod or wand; specifically, the discovery of things concealed in the earth, as ores, springs of water, etc., by means of a divining rod.

Rhabdophane, a rare mineral occurring in small mammillary aggregations, with a somewhat fibrous radiating structure. Crystallization probably tetragonal. Color, dark garnet-red. Composition: A hydrated phosphate of cerium, didymium, lanthanum, and yttrium, with the probable formula, R_2O_3 , P_2O_5 , $2H_2O$, in which $R_2O_3 =$

C_2O_3 , Di_2O_3 , La_2O_3 , Yt_2O_3 , which may replace each other. Found by Lettsom in old collections of minerals with the designation of "blende from Cornwall."

Rhacophorus, a genus of *Polypedatidæ*, with seven species, from the Oriental region. The fingers and toes are entirely webbed, and the terminal disks very large; vomerine teeth in two series. *R. rheinhardtii* is one of the larger treefrogs.

Rhadamanthus, in Greek mythology, a son of Zeus and Europa, and brother of Minos, King of Crete, whom he assisted in his sovereignty, and whose jealousy he aroused by his inflexible integrity, which earned for him the admiration of the Cretans. Rhadamanthus then fled to Bœotia, where he married Alcmena. After his death he became, on account of his supreme justice, one of the three judges of the lower world.

Rhætia, a province of the Roman empire, which included great part of the Alpine regions between the valleys of the Danube and the Po, and corresponded with the districts occupied in modern times by the Austrian province of Tyrol and the Swiss canton of Grisons. The Rhætians, who are generally supposed to have been of Etruscan origin, were subdued by Drusus and Tiberius, 15 B. C.; and shortly afterward Rhætia was incorporated as a province in the Roman empire. During the last days of the Roman empire, when the barbarians devastated the provinces, Rhætia was nearly depopulated; and after the fall of the Roman empire it was occupied by the Alemanni and Suevi.

Rhætic Beds, in geology, the uppermost strata of the Triassic, or, according to others, the lowest of the Liassic group; well represented in England and Germany, but most extensively developed in the Rhætian Alps, whence their name. They are more highly fossiliferous than any of the other members of the Triassic period.

Rhamnaceæ, an order of plants, classed by Lindley under his 44th or Rhamnal alliance. The calyx, which is four or five cleft, is valvate. The petals are as many, and inserted into the orifice of the calyx; sometimes they are wanting. The stamens are four or five, and opposite to the petals. The ovary is superior, or half so, with two, three, or four cells, each having one erect seed; fruit berried or dry. The flowers are small and generally green; the leaves are simple and generally alternate. The order consists of trees and shrubs, often spiny. There are species in nearly all countries, with the exception of the Arctic zone. Known genera 42, species 250 (Lindley); genera 37 species 430 (Sir Joseph Hooker). Berries belonging to various

Rhamnocathartin

plants of the order have been used for dyeing yellow, green, or intermediate tints, others are eatable. One plant is used by the poorer classes in China for tea. Others have been employed as astringents, purgatives, tonics, sedatives, etc.

Rhamnocathartin, in chemistry, the uncrystallizable principle of buckthorn berries. It is an amorphous, yellowish, brittle mass, soluble in all proportions in water and alcohol, but insoluble in ether. It has a bitter and very repulsive taste, and, when heated, melts to a yellowish-brown oil, gives off inflammable vapors, and leaves combustible charcoal. Ferric chloride colors it dark green, and, when heated with nitric acid, it yields a large quantity of picric acid.

Rhamnotannic Acid, in chemistry, a greenish-yellow amorphous powder, obtained by evaporating the juice of ripe buckthorn berries, exhausting the extract with hot alcohol, filtering, evaporating filtrate nearly to dryness, and adding cold water. It has a bitter, astringent taste, melts and decomposes when heated, is insoluble in cold water, slightly soluble in boiling water, but very soluble in alcohol and ether. In tartar emetic it deposits a yellowish powder after standing some time, but it does not precipitate solution of gelatine.

Rhamnus, in botany, a genus of plants, the typical one of the order *Rhamnaceæ*. The calyx is four or five cleft, the petals are sometimes wanting; ovary three or four celled. The berry consists of two to four nuts, each one-seeded. The bark of *R. catharticus* yields green dye, and its berries as also those of *R. infectorius*, when unripe, a yellow dye. Mixed with gum-arabic and lime water they form bladder-green. *R. purpurea* is a purgative, *R. wightii*, an astringent and a deobstruent.

Rhapsodist, strictly, one who strings songs together, but usually applied to a class of persons in ancient Greece, who earned their living by reciting the poems of Homer. It is believed that to these persons we are chiefly indebted for the preservation of the Homeric poems. In the present day, a rhapsodist is one who composes rhapsodies or collections of poetical effusions, descriptions, etc., strung together without any natural connection or necessary dependence.

Rhatany, or **Rattany**, a half-shrubby plant, of the natural order *Polygaleæ*, a native of the cold sterile table-lands of the Andes in Peru and Bolivia. It is called *ratanhia* in Peru. It is valued for the medicinal properties of the root, which are shared more or less by other species of the same genus, also natives of South America. In the British pharmacopœia the dried

Rhea

roots of two species (*Krameria triandra*, Peruvian rhatany, and *K. ixina*, Savanilla rhatany) are officinal under the name *Krameria Radix*. The roots vary a good deal in size and thickness, but are always rough-looking, and reddish in color. The bark has a strongly astringent taste, and when chewed tinges the saliva red; the wood is nearly tasteless. The dried root is a powerful astringent, and is employed in diarrhœa, mucous discharges, passive hæmorrhages, and cases where an astringent or styptic action is indicated. The finely-powdered root is also a frequent constituent of tooth-powders. Rhatany root is imported from various parts of South America, but chiefly from Lima. It is extensively imported into Portugal in order to communicate a rich red color to wines. Its peculiar properties are due to rhatany-tannic acid, found in the root-bark to the extent of 20 per cent.; it also contains a red coloring matter.

Rhea, in Greek mythology, the daughter of Cœlus and Terra, or Heaven and Earth; the wife of Saturn, and mother of Jupiter,



RHEA, SYLVIA, AND MARS.

Juno, Ceres, Vesta, and several other deities. When Jupiter usurped the sovereignty of the skies, and expelled his father from the empyrean, Rhea followed her dis-crowned husband, Saturn, to earth, and when he founded a terrestrial kingdom in Italy, she exercised such benevolence and charity, so constantly promoted virtue, and was so beloved for her example and goodness, that, under her auspices, universal peace and happiness prevailed on earth, so as to obtain the appellation of the "Golden Age," or the reign of Rhea.

Rhea, in ornithology, a genus of *Struthionidæ*, or, if that family is divided, of *Struthioninæ*. Three toes are present, the neck is covered with feathers, and the tail is almost obsolete. They are sometimes called South American ostriches, but are

Rhea

smaller than the true ostrich, and the whole plumage is somber. There are two well-established species, *R. americana*, the common, and *R. darwini*, Darwin's rhea, the former ranging from Bolivia, Paraguay, and the S. of Brazil down to Magellan's Straits, the latter inhabiting Eastern Patagonia. *R. macrorhyncha* was given specific distinction by Dr. Selater in 1860, but subsequent investigations led him to believe that the individuals belonged to a locally isolated race of *R. americana*, probably existing somewhere in the campos of the interior of Northeastern Brazil.

Rhea, a variety of the nettle family, which grows luxuriantly in India. From the delicate fibers in its bark the finest and strongest textile fabrics can be produced, and in the manufacture of such fabrics it is unrivalled. The hindrance to its use has hitherto lain in the difficulty and cost of separating the fibers from the gums and cortex of the bark in which they are embedded. However, an Anglo-Indian chemist, Mr. Gomess, has succeeded in elaborating a chemical process which frees the fiber from the resins in which it is embedded, by the use of zincate of soda; and this process, after numerous trials, the Indian government has pronounced a complete success. A large demand has consequently sprung up for the "ribbons" or strips of dried bark, and the probability is that the industry may assume enormous proportions, and even rival the cultivation of jute. The fibers may be produced in practically unlimited quantities, and the Indian government is spreading information as to the best means of cultivating the plant and preparing and drying the "ribbons" for market. Rhea fibers can be worked into every variety of fabric, from velvets to laces. It is specially suitable, from its lightness and toughness, for tents and ship canvas, and it is found to be far more durable than linen.

Rhea, Mademoiselle (MLLE. HORTENSE BARBE-LORET), a Belgian actress; born in Brussels, Belgium, Sept. 4, 1844. Educated at the Ursuline Convent, Paris, France; she began to study for the stage soon after leaving school; made her début at the Théâtre de la Monnaie, Brussels, in "Fairy Fingers"; was engaged at Rouen and at the Vaudeville, Paris; made a tour of France; was leading actress at the Imperial Theater, St. Petersburg, 1876-1881; played, in English, Beatrice in "Much Ado About Nothing," at the Gaiety Theater, London, in 1881; acted in the United States in 1881 and 1882. Her repertory contained "Adrienne Lecouvreur"; "Camille"; "Pygmalion and Galatea"; "School for Scandal"; "Frou-Frou"; "Josephine, Empress of the French"; "The New Mag-

Rheims

dalen"; "Lady of Lyons"; "Nell Gwynn"; etc. She died in Montmorency, France, May 5, 1899.

Rhead, Louis John, an American artist; born in Etruria, England, in 1860; was educated at the Art Training School, South Kensington, London; and came to the United States in 1883 to become art manager for D. Appleton & Co. He was a painter in both oil and water-colors, and illustrated many books, the principal ones being "Pilgrim's Progress"; "Idyls of the King"; "Robinson Crusoe"; and "Psalms of David." He won a medal in Boston in 1895 for his artistic posters.

Rhees, Rush, an American educator; born in Chicago, Ill., Feb. 8, 1860; was graduated at Amherst College in 1883, and at the Hartford Theological Seminary. In 1889 he accepted a pastorate at Portsmouth, N. H., where he remained till 1892 when he went to the Newton Theological Institution, Newton Center, Mass., and in 1894 became Professor of Biblical Interpretation of the New Testament. There he became a member of the Society of Biblical Literature and Exegesis; and was author of "The Life of Jesus of Nazareth, a Study"; "History of Theology"; and many articles for reviews, etc. He was elected president of the University of Rochester, Rochester, N. Y., July 1, 1900.

Rhees, William Jones, an American bibliographer; born in Philadelphia, Pa., March 13, 1830; had charge of the social statistics of the 7th census in 1850-1852; was secretary of the Central Executive Committee in Washington, of the London World's Fair in 1851; and had been chief clerk of the Smithsonian Institution and had charge of its publications since 1852. He was one of the founders of the present Y. M. C. A., and Sons of the American Revolution; author of "Manual of Public Libraries," "Institutions and Societies in the United States and British Provinces of North America," "The Smithsonian Institution: Documents Relative to Its Origin and History," etc.; and editor of "The Scientific Writings of James Smithson." He died in 1907.

Rhegium. See REGGIO.

Rheims, or Reims, a city in the French department of Marne; on the Vesle; 100 miles E. N. E. of Paris. Strongly fortified with detached forts since the Franco-Prussian War, when it was for a time the German headquarters, it is well built, and from the material employed in building, which is the chalkstone of the district, and from the prevalence of the older style of domestic architecture, has a picturesque appearance. It is built on the site of Durocor-

torum, which is mentioned by Cæsar as the capital of the Remi, from which people it subsequently took its present name. Christianity may have found an entrance into Rheims at an earlier period, but it was not till about 360 that it became a bishop's see. Under the Frank rule it was a place of much importance, and it acquired a deeply religious interest from its having been the scene in 496 of the baptism of Clovis and his chief officers by the bishop, St. Remy (438-533). In the 8th century it became an archbishopric, and from 1179, when Philip Augustus was solemnly crowned here, it became the place for the coronation of the kings of France, who were anointed from a vessel of sacred oil, called "sainte ampoule," which a dove was said to have carried to St. Remy from heaven. Joan of Arc brought the dauphin hither, and the only sovereigns in the long series, down to 1825, not crowned at Rheims were Henry IV., Napoleon I., and Louis XVIII. In 1793 the cathedral was attacked by the populace, and the sainte ampoule smashed by a sans-culotte; and in 1830 the ceremony of coronation at Rheims was abolished. The cathedral, though the towers of the original design are still unfinished, is one of the finest extant specimens of Gothic architecture. It was built between 1212 and 1430, and in 1877 the government voted \$400,000 toward restoration. Its nave is 466 feet long by 99 in breadth, with a transept of 160 feet, and the height is 144 feet. Its grandest features are the W. façade, which is almost unrivaled, with its magnificent doorway, and the so-called Angel Tower, which rises 59 feet above the lofty roof. The stained glass is remarkable for its beauty; the organ is one of the finest in France; and two survive out of six magnificent tapestries. The Romanesque church of St. Remy (mainly 1160-1180), with the saint's shrine, is nearly of equal size, but of less architectural pretension. Also noteworthy are the town hall (1627-1880); the ancient "Maison des Musiciens" (Musicians' House), and archiepiscopal palace; the Porta Martis, a Roman triumphal arch; the Lycée, representing a former university

(1547-1793); and statues of Louis XV. and two natives, Colbert and Marshal Drouet. Rheims is one of the principal entrepôts for the wines of Champagne, and the hills which surround the town are planted with vineyards, and many workmen are employed. It is one of the great centers of the woolen manufacture in France, and its manufactures, embracing woolen goods (especially merinoes), mixed fabrics in silk and wool, etc., are known in



RHEIMS CATHEDRAL.

commerce as "Articles de Rheims." Pop. (1906) 109,859.

Rheinberger, Josef, a German composer; born in Vadutz Lichtenstein, March 17, 1839; resided in Munich after 1851. He was a very industrious and learned composer, and one of the most celebrated contrapuntists of his time. His organ works especially are favorites.

Rhenish Architecture, the style assumed by the later Romanesque architecture in the countries bordering on the Rhine. It had round arches, and the churches were originally round, with small circular or octagonal towers. Under the main moldings small arcade-galleries were

Rhenish Prussia

introduced, instead of the corbel tables. These galleries consisted of detached shafts, which, being connected by arches, formed an open passage. The façades of houses usually had gables rising in steps. The windows were often divided into two lights by small columns, with richly-carved capitals, and surmounted by an arch appertaining to both. See ROMANESQUE ARCHITECTURE.

Rhenish Prussia (German, Rheinland), the extreme W. province of Prussia, touching W. and N. Luxemburg, Belgium, and Holland; area, 10,423 square miles; greatest length from N. to S. about 200 miles; greatest breadth about 90; pop. (1905) 6,436,337. In the S. it is hilly, being traversed by the ranges of the Eiffel, Hochwald, etc. It is watered by the Rhine, the Moselle, and some affluents of the Meuse. A large proportion of the surface is in forest. Besides the usual cereal crops, tobacco, hops, flax, rape, hemp, and beet-root are raised; fruit culture and the vine culture are also carefully attended to. Cattle are extensively reared. It is the most important mineral district in Germany, abounding in coal, iron, lead, zinc, etc. It is likewise an active manufacturing district, there being numerous iron works and machine shops, textile factories, breweries, distilleries, etc. It is divided into five governments or districts of Coblenz, Treves, Cologne, Aachen (Aix-la-Chapelle), and Düsseldorf. The city of Coblenz is the official capital of the province, but Cologne is the town of most importance.

Rhenish Wines, the general designation of the wines produced in the region watered by the Rhine, and specifically for those of the Rheingau, the white wines of which are the finest in the world. The red wines are not so much esteemed, being considered inferior to those of Bordeaux. Good wines are also produced in the valleys of the Neckar, Moselle, and other tributaries of the Rhine. The vineyards are mainly between Mannheim and Bonn, and the most valuable brands of wines are those of Johannisberg, Steinberg, Hochheim, Rüdesheim, Rauenthal, Markobrunn, and Assmannshausen, the last being a red wine.

Rheostat, the name given by Wheatstone to an instrument for varying an electric resistance between given limits. Many forms have been suggested and used by Pouillet, Jacobi, Poggendorff, Wheatstone, and others. The most serviceable is perhaps Sir W. Thomson's modification of Wheatstone's double-cylinder rheostat. In it a platinum or platinoid wire is wound round two parallel cylinders, one of which is metal and the other of some insulating material. In any position the part of the wire which is effective as a resistance is the part that is on the insulating cylinder

Rhetoric

up to where it comes in contact with the metal cylinder. By means of a gearing of toothed wheels and screw shaft the two cylinders are turned simultaneously in one or the other direction, while at the same time a nut travels to or fro and guides the wire as it leaves the one cylinder and coils itself round the other.

Rhesus, a king of Thrace, whose horses were carried off and himself killed by Ulysses and Diomedes, in the night on which he came to assist Priam, before they could drink of the water of the Xanthus, as the oracle had declared that otherwise Troy could not be taken.

Rhesus, a genus of monkeys, separated by Lesson from *Macacus*. Also *Macacus rhesus*, the Rhesus monkey, from India, in some parts of which it is considered sacred. Length, from 18 inches to 2 feet; tail from 6 to 8 inches. Prevailing color olive-green, brown on back, face pale flesh-color, callosities and insides of legs often very red.

Rhetoric, its broadest sense, the theory and practice of eloquence, whether spoken or written. It aims at expounding the rules which should govern all prose composition or speech designed to influence the judgments or the feelings of men, and therefore treats of everything that relates to beauty or force of style, such as accuracy of expression, the structure of periods, and figures of speech. But in a narrower sense rhetoric concerns itself with a consideration of the fundamental principles according to which particular discourses of an oratorical kind are composed. The first to reduce oratory to a system were the Sicilian Greeks; its actual founder is said to have been Corax of Syracuse (500 B. C.). He divided the speech into five parts, proem, narrative, arguments, subsidiary remarks, and peroration; and he laid great stress on the rhetorical capabilities of general probability. Later masters of rhetoric were Tisias; Gorgias of Leontini, whose style was burdened with too much ornament and antithesis; Antiphon, the earliest of the so-called "Ten Attic Orators," and the first writer of speeches for others to deliver in court. The speeches given by his great pupil Thucydides throughout his history, and the orations of Andocides, second of the Ten, are severely free from the florid ornament of later days. Lysias was an orator rather than a rhetorician; Isocrates first thoroughly taught rhetoric, which he defined as the "science of persuasion," as a technical method and discipline. His most celebrated pupils were Hyperides, Speusippus, and Isæus. The great Demosthenes was a pupil of the last. His opponent Æschines, and his contemporaries Hyperides, Lycurgus, and Dinarchus complete the Ten. Anaximenes of Lampsacus composed

the oldest extant manual of rhetoric, but the great classical work on this subject is the analytical masterpiece of Aristotle. According to him its function is not to persuade, but to discover the available means of persuasion in any subject. He regards it as the counterpart of logic, and arranges its uses as (1) the means by which truth and justice assert their superiority to falsehood and injustice; (2) the only method of persuasion suitable to popular audiences; (3) a means of seeing both sides of a case and of discerning the weakness of an adversary's argument; (4) as a means of self-defense. The means of persuasion he groups in two classes: (1) the inartificial proofs, such as statements of witnesses, contracts, and the like; (2) the artificial proofs, whether these are (a) logical, demonstration, or seeming demonstration by argument; (b) ethical, when the speaker induces confidence by the weight of his own character; or (c) emotional, when he works persuasively on the feelings of his hearers.

Of these artificial proofs, first comes the logical, and this depends on the enthymeme, "a syllogism from probabilities" and signs; next is the example. Of the materials of enthymemes, the topics or commonplaces of rhetoric, Aristotle distinguishes between the common, general heads applicable to all subjects as to their possibility or impossibility, and the special, those drawn from special arts or faculties.

He divides the three provinces of rhetoric thus: (1) Deliberative rhetoric, concerned with exhortation or dissuasion, and future time, its ends expediency and in expediency; (2) forensic rhetoric, concerned with accusation or defense, and with time past, its ends justice and injustice; (3) epideictic rhetoric, concerned with eulogy or censure, and usually with time present, its ends being honor and disgrace, or nobleness and shamefulness. In his first two books Aristotle deals with invention, the discovery of means of persuasion; in the third, with expression and arrangement; and he begins the subject by discussing the art of declamation or delivery. Under verbal expressions he discusses the use of metaphor, simile, proverbs, rhythm, and variety of styles, as the literary and controversial, whether the political or the forensic.

Aristotle's method dominated the Peripatetic school, but later began to be modified by the florid influence of Asia, the originator of which was Hegesias of Magnesia. The school of Rhodes followed more closely Attic models, and gained great fame through its conspicuous leaders Apollonius and Molon (100-50 B. C.). Hermagoras of Temnos (120 B. C.) composed an elaborate system which long retained its influence.

Later rhetoricians were Dionysius of Halicarnassus, Longinus, Hermogenes, Apsines, Menander, Theon, and Aphthonius. Among the earliest Roman orators were Appius Claudius Cæcus (300 B. C.), Cato the Censor, Ser. Sulpicius Galba, Caius Gracchus, Marcus Antonius, and Lucius Lucinius Crassus. The instructors in formal rhetoric were Greek, and the great masters of theoretical and practical rhetoric alike, Cicero and Quintilian, were both formed by Greek models. The former contributed to a discussion of its theories no less than three treatises, "De Oratore," the "Brutus," and the "Orator"; the latter's famous "Institutio Oratorio" still retains its value. Quintilian strove hard to reform the taste of the time, which had become Asiatic through exclusive attention to the form and perpetual exercises in the schools on imaginary subjects—the *suasoriæ* and *controversiæ* of the elder Seneca. The "Dialogus de Oratoribus," long ascribed to Tacitus, was another protest against modern fashion. The younger Pliny's "Panegyric" long remained a model for later orators. During the first four centuries of the empire rhetoric continued to be taught by "sophists" at Athens, Smyrna, Rhodes, Tarsus, Antioch, Alexandria, and Massilia. These were in most esteem under Hadrian, the Antonines, and Marcus Aurelius—among the most celebrated were Theodotus, Polemon, and Adrian of Tyre. Throughout the Middle Ages rhetoric formed one of the subjects of the *trivium*; its leading authorities were Martianus Capella, Cassiodorus, and Isidorus. The subject reawoke with the revival of learning, and was taught regularly in the universities, the prescribed public exercises and disputations keeping it long alive; but in later generations it has constantly languished, in spite of more or less laborious or effective attempts to fan it into life by the sententious Blair, the solid Campbell, and the sagacious Whately. In the United States, however, considerable attention is paid to it as a branch of general education.

Rhett, Robert Barnwell, an American lawyer; born in Beaufort, S. C., Dec. 24, 1800; after practising as an attorney for several years in South Carolina he was elected attorney-general of the State in 1833; was one of the leaders in the Nullification movement, and was elected United States Senator; made some speeches in Congress noted for force, conciseness, and argument; was editor of the Charleston "Mercury" and directed its Nullification and ultra-secession policies. He was a member of the State Convention which passed the secession ordinance, and was one of the committee that formulated the address giving reasons for the act. He was conspicu-

Rhett

ous during the organization of the Confederate government, and as a member of its Congress was particularly active. He did not participate in public affairs after the Civil War, and died in St. James' Parish, La., Sept. 14, 1876.

Rhett, Thomas Grimke, an American military officer; born in South Carolina about 1825; was graduated at the United States Military Academy and assigned to the Ordnance Corps in 1845, and served at the Washington arsenal till 1846, when he was transferred to the Mounted Rifles, and sent to Mexico. He served in the Mexican War; was brevetted captain for gallantry in the defense of Puebla in 1847; was on frontier duty after the war; became captain in 1853, and paymaster with the rank of major in 1858. He resigned his commission in 1861, and sought high office in the Provisional Confederate army, but not receiving it he returned to South Carolina, where he was commissioned a Major-General by the governor. He was chief of staff to Gen. Joseph E. Johnston, till 1862, when he was ordered to the Trans-Mississippi Department. After the war he was colonel of ordnance in the Egyptian army in 1870-1873, when he resigned owing to ill health. He died in Baltimore, Md., July 28, 1878.

Rheum, rhubarb; a genus of *Polygonææ*. Calyx inferior, petaloid, six-partite; stamens about nine; ovary superior; ovule one, erect; styles three, reflexed; stigma, peltate, entire; achenium three-angled, winged, with the withered calyx at the base. *R. rhaponticum* is the common, or garden rhubarb. It is used in the United States in the making of pies, and is often called pie plant. *R. officinale*, or *R. palmatum*, is the officinal rhubarb. *R. emodi*, in the Punjab Himalaya, from 6,200 to 14,000 feet, with *R. moorcroftianum* and *R. speciforme*, are the chief sources of the Himalayan or Indian officinal rhubarb. It is less active than the common kind. The stalks of *R. emodi* are eaten by the Hindus. Other Indian species are *R. webbianum*, *R. nobile*, *R. arboreum*, which yields so much honey that the ground under the plants is wet with it, and *R. cinabarinum*, said to poison goats in Sikkim. *R. undulatum* grows in China and Siberia. The roots of *R. ribes* are used by the Arabs as an acidulous medicine, and its leaf-stalks in the preparation of sherbet.

In pharmacy, three leading kinds of rhubarb are recognized: (1) The Turkey or Russian rhubarb, which is wild neither in the one country nor the other, but used to be brought from China via Turkey, and then from China via Russia; (2) the East Indian, and (3) the Batavian rhubarb. An extract, an infusion, a syrup, a tincture, and a wine of rhubarb, with a compound

Rheumatism

rhubarb pill, are used in pharmacy. In small doses rhubarb is stomachic and slightly astringent; in large doses, a purgative, but its action is followed by constipation.

Rheum, in pathology, a defluxion of fluids on any part; specifically, an inflammatory action of the mucous glands, attended with an increased and an altered state of the excreted fluids.

Rheumatism, a term which has been, and still is, rather vaguely and extensively used in the nomenclature of disease. But there is one very definite affection to which it is always applied; after this has been discussed the other senses in which it is used will be considered.

Acute rheumatism or rheumatic fever is indicated by general febrile symptoms, with redness, heat, swelling, and usually very intense pain, in and around one or more (generally several, either simultaneously or in succession) of the larger joints, and the disease shows a tendency to shift from joint to joint or to certain internal serous membranes, especially the pericardium and the endocardium; rheumatism being the most common origin of pericarditis, as has been already shown in the article on that disease. The pulse is strong and full, there is headache, but seldom delirium, unless in very severe cases; the tongue is covered with a creamy thick fur, the tip and edges being red; the urine is turbid, and abnormally acid; and the skin is bathed in a copious perspiration, with so characteristic a smell (resembling that of sour milk) that the physician can often recognize the disease almost before he sees the patient. The joints are extremely painful, and the pain is much increased by pressure, and consequently by movement which gives rise to internal pressure. Hence the patient lies fixed in one position from which he dares not stir.

The usual exciting cause of acute rheumatism is exposure to cold, and especially to cold combined with moisture, and hence the greater prevalence of this disease among the poor and ill-clad. Sleeping in damp sheets or on the damp ground, the wearing of wet clothes, and sitting in a cold damp room, especially if the sitter was previously warm from exercise, are examples of the kind of exposure which is apt to be followed by this disease. Rheumatism is not, however, a universal sequence to exposure to the cold. It only occurs when there is a special predisposition, or, as it is termed, a rheumatic diathesis or constitution, and the diathesis may be so strongly developed as to occasion an attack of acute rheumatism, independently of exposure to any apparent exciting cause. Acute rheumatism is often associated with

chorea, but the exact nature of the relation between the two is not known. Scarlet fever is the only other disease which seems specially liable to be followed by acute rheumatism. Men are more subject to the disease than women, but this probably arises from their greater exposure to atmospheric changes on account of the nature of their occupations. The predisposition is certainly affected by age; children under 10 years being comparatively seldom attacked, while the disease is most prevalent between the age of 15 and 40. Above this age a first attack is rare, and even recurrences are less frequent than earlier in life. Persons once affected become more liable to the complaint than they previously were. The disease is hereditary in a considerable proportion of cases; and even when it cannot be traced in previous generations the predisposition is very apt to exist in several members of the same family. The exact nature of the disease poison is unknown. Dr. Prout regarded lactic acid as the actual *materies morbi*, but, though certain facts tend to confirm this view, it cannot be regarded as satisfactorily proved.

In the great majority of cases acute rheumatism ends in recovery; and permanent damage to the affected joints is rare. It is, however, extremely apt to recur, either in the early stages of convalescence, or after an interval of months or years. The chief danger arises from implication of the heart, which very frequently occurs; probably in about one-half of those suffering for the first time either the pericardium or endocardium or both are affected. The younger the patient the greater the liability to these complications, which usually result in more or less permanent impairment of the heart's action. Another condition, much less common, but extremely fatal, is known as rheumatic hyperpyrexia, and is characterized by a very rapid rise of temperature to 108° or 110° , with head symptoms in the form either of drowsiness or of violent delirium.

The patient should be strictly confined to bed between blankets (*i. e.*, without sheets), and be clothed in flannel; he must be carefully protected from draughts, and from undue pressure of the bed clothes, and supplied with light nourishment and diluent drinks. Under such conditions, without other treatment, most cases recover in the course of time. Till the last quarter of the 19th century there was no general agreement as to what more should be done. When bleeding was used for most acute diseases this one was no exception. When that practice was abandoned numerous drugs were used, in some cases with apparent success. Quinine, iron, lemon juice, colchicum, large blisters to all the affected joints, were all recommended; more in favor

than any of these were alkalis in large doses. But in 1876 Stricker in Berlin and MacLagan in England called attention to another method of treatment which is now almost universally adopted. Though new to Europe it has long been in use elsewhere, for the natives of South Africa have from time immemorial treated the disease by willow-top infusion. This method consists in the administration of SALICIN (*q. v.*), or one of its derivatives (salicylic acid, salicylate of soda, etc.). The last is at present most largely used. It is usually given in doses of 15 or 20 grains every two or three hours at first; but its action needs to be carefully watched, as it often causes considerable depression and other uncomfortable symptoms. It is admitted by almost all observers that it has a remarkable effect in reducing the fever, relieving the pains, and cutting short the attack; but under this treatment, as without it, relapses are frequent. In rheumatic hyperpyrexia the only treatment that has been found effectual is immersion in a tepid bath as often as the temperature rises to a dangerous point. Convalescence is usually very slow, and it is necessary to keep the patient in bed and on low diet for some time after the fever has disappeared to diminish the tendency to relapse. At this stage tonics, especially quinine and iron, are generally useful.

Chronic Rheumatism.—Chronic painful affections of the joints sometimes follow rheumatic fever and are clearly a consequence of it. The name is often erroneously applied to chronic and insidious forms of gout. There is another form of disease to which most of the cases of so-called "chronic rheumatism" belong, probably distinct from both rheumatism and gout, popularly so called, though it is often called "rheumatic gout," which deserves separate mention.

Osteo-arthritis (chronic rheumatic arthritis and rheumatic arthritis are among its many other names) is characterized in most cases by a very chronic course, by pain and stiffness in one or more of the joints, with creaking on movement, and by destructive changes of the cartilages of the affected joints, with enlargement of the ends of the bones in their neighborhood. It is more common in women than in men; most often begins at or after middle life, though occasionally even in childhood; and is apt to affect those who are weakly and who have had a life of hard work with defective nourishment. There is no special liability to affection of the heart as in true rheumatism. In the treatment of this ailment hot baths and douches, particularly with certain mineral waters (*e. g.*, those of Bath, Aix-les-Bains), and a warm dry climate are very valuable; a generous diet is essen-

tial. Of drugs, cod-liver oil and arsenic are most often serviceable; but many others, iron, quinine, guaiacum, etc., are also of use. Under any treatment, however, complete recovery is exceptional; but the disease, even when severe, does not much shorten life.

Gonorrheal rheumatism is a form of joint-disease closely simulating acute rheumatism which occurs in some cases of gonorrhea. The affection does not, however, flit from joint to joint in the same way, and is not amenable to the same treatment.

Muscular rheumatism is the name usually given to painful affections of the muscles for which no clear cause is discoverable; it usually depends either on defective digestion or imperfect excretion of waste products from the system, and eliminant treatment, by alkalis, purgatives, or diaphoretics, is usually indicated. But it is very doubtful whether the cause is the same as in acute rheumatism.

Rheumatic Diseases of Animals.—These are less common than the corresponding affections of men. Horses are not very liable to acute rheumatism, but suffer from a chronic variety, which occurs especially in conjunction with influenza. When affecting the limbs it often exhibits its characteristic tendency to shift from one part to another. In cattle and sheep rheumatic disorders are more common and acute than in horses. The specific inflammation sometimes involves most of the fibrous and fibroserous textures throughout the body, inducing general stiffness, constipated bowels, and high fever. This is rheumatic fever—the chine-felon or body-garget of the old farriers. Sometimes the disease mainly affects the larger joints, causing intense pain, lameness, and hard swellings; occasionally it is confined to the feet and fetlocks, when it is recognized as bustian-foul. Cattle and sheep on bleak exposed pastures, and cows turned out of the dairy to feed on strong alluvial grazings are especially subject to rheumatism in its several forms. Among dogs rheumatism is known under the name of kennel lameness, and is very troublesome and intractable in low, damp, cold situations. Blood-letting is rarely admissible except in the most acute cases among cattle. In all animals a laxative should at once be given, with some saline matters and colchicum, and when the pain and fever are great a little tincture of aconite may be added. For cattle a good combination consists of one ounce of niter, two drachms of powdered colchicum, and two fluid drachms of the pharmacopœia tincture of aconite, repeated in water or gruel every three hours; half this does will suffice for horses. With a simple laxative diet dogs should have a pill night and morning containing five grains

of niter and two of colchicum. Comfortable lodgings, a warm bed, horse-rugs on the body, and bandages on the legs will greatly expedite a cure. In chronic cases, or after the more acute symptoms are subdued, an ounce of oil of turpentine and two drachms each of niter and powdered colchicum should be given for a cow, half that quantity for a horse, and one-fourth for a sheep. Hartshorn and oil, or other stimulating embrocations, "diligently and frequently rubbed in, will often abate the pain and swelling of the affected joints.

Rhigas, Constantine, a Greek poet, the Tyrtaeus of modern Greece, and the first mover of the war for Grecian independence; born about 1753. He formed the bold plan of freeing Greece from the Porte by means of a great secret association, and composed in his native language a number of patriotic songs, calculated to inflame the imagination of the Greek youth and to embitter them against the Mussulmans. During the Greek war of independence, which ultimately led to the emancipation of their country from the Turkish rule, his songs were in the mouth of every one. He was arrested and put to death by the Turkish authorities in Belgrade, in May, 1798.

Rhigolene, a petroleum naphtha, proposed by Dr. H. J. Bigelow, of Boston, Mass., as a local anæsthetic. It is applied in the form of spray in minor operations, producing intense cold by its evaporation.

Rhinanthus, in botany, yellow-rattle; the typical genus of *Rhinanthideæ*. Calyx inflated, four-toothed, upper lip of the corolla laterally compressed, entire, with a tooth-like appendage or lobe on each side, lower lip plane, three-lobed; ovules many; capsule two-celled, compressed.

Rhine (German, Rhein; Dutch, Rijn), the finest river of Germany, and one of the most important rivers of Europe, its direct course being 460 miles and its indirect course 800 miles (about 250 miles of its course being in Switzerland, 450 in Germany, and 100 in Holland); while the area of its basin is 75,000 square miles. It is formed in the Swiss canton Grisons by two main streams called the Vorder and Hinter Rhein. The Vorder Rhein rises in the Lake of Toma, on the S. E. slope of the St. Gothard, at a height of 7,690 feet above the sea, near the source of the Rhone, and at Reichenau unites with the Hinter Rhein, which issues from the Rheinwald Glacier, 7,270 feet above sea-level. Beyond Reichenau, which is 7 miles W. of Coire, the united streams take the common name of Rhine. From Coire the Rhine flows N. through the Lake of Constance to the town of that name, between which and Basel it flows W., forming the boundary between

Rhine

Switzerland and Germany. At Basel it turns once more to the N. and enters Germany; and, generally speaking, it pursues a N. course till it enters Holland, below Emmerich, when it divides into a number of separate branches, forming a great delta, and falling into the sea by many mouths. The chief of these branches are the Waal and Lek, which unite with the Maas; the Yssel and Vecht, which diverge to the Zuyder Zee; and that which retains the name of Rhine, a small stream that passes Leyden and enters the North Sea. In the German part of its course the chief tributaries it receives on the left are the Ill, Nahe, Moselle (with the Saar), Ahr, and Erft; and on the right the Neckar, Main, Lahn, Sieg, Ruhr, and Lippe. In Switzerland its tributaries are short and unimportant, and this part of its course is marked by the Falls of the Rhine at Schaffhausen, where the river is precipitated in three leaps over a ledge of rocks 48 to 60 feet in height, and by the cataracts of Lauterberg and the rapids of Rheinfelden. The chief towns on its banks are Constance and Basel in Switzerland; Spire, Mannheim, Mainz, Coblenz, Bonn, Cologne, and Düsseldorf, with Worms and Strasburg not far distant, in Germany; Arnheim, Utrecht, and Leyden, in Holland. Its breadth at Basel is 750 feet; between Strasburg and Spire from 1,000 to 1,200 feet; at Mainz, 1,500 to 1,700 feet; and at Emmerich, where it enters the Netherlands, 2,150 feet. Its depth varies from 5 to 28 feet, and at Düsseldorf amounts even to 50 feet. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries has been seriously interfered with since the introduction of steam vessels. It is navigable without interruption from Basel to its mouth, a distance of 550 miles, and much timber in rafts, coal, iron, and agricultural produce are conveyed by it. Large sums are spent every year in keeping the channel in order, and in the erection or repair of river harbors, both in Germany and Holland. The shipping has greatly increased since the introduction of steam vessels, which also ply on the Main, the Neckar, the Maas, and the Moselle.

The Rhine anciently formed the boundary between the Roman empire and the Teutonic hordes. After the partition of the domains of Charlemagne in 843 it lay within the German empire for nearly 800 years. France long cast covetous eyes on the Rhine, and the Peace of Westphalia in 1648 gave her a footing on the left bank. In 1801 the whole of the left bank of the Rhine was formally ceded to France. The Congress of Vienna in 1815 restored part of the Rhenish valley to Germany, and the cession by France of Alsace and Lorraine

Rhinoceros

after the war of 1870-1871 made the Rhine once more German. The Rhine is distinguished by the beauty of its scenery, which attracts many tourists. For a large part of its course it has hills on both sides at less or greater distances. Pleasant towns and villages lie nestled at the foot; above them rise rocky steeps and slopes clothed at one time with vines, at others with natural wood, and every now and then the castles and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part for scenery is between Bingen and Bonn; after entering Holland the views are generally tame and uninteresting.

Rhine Wines, a general term for wines made from the grapes grown on the borders of the Rhine, but more specifically from those of the Rheingau, a district in the S. W. of Nassau, and formerly belonging to the archbishopric of Mayence. The best white Rhine wines are Johannisberg, Hochheimer, Rudesheimer, Steinberger, Rothenberger, and Markobrunner. The Asmannshäuser is the best known of the red wines.

Rhinobatidæ, a family of plagiostomous fishes, section Batoidei. Tail long and strong, with two well-developed dorsals, and a longitudinal fold on each side; caudal developed. Disk not excessively dilated, the rayed portion of the pectorals not being continued to the snout. Three genera: *Rynchobatus*, *Rhinobatus*, and *Trygonorhina*. They apparently commenced in the Oölite.

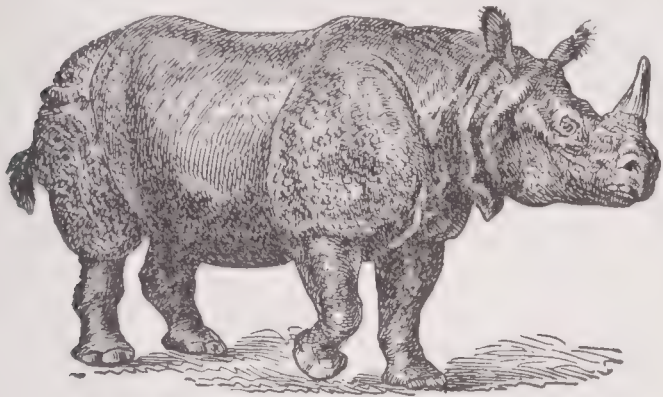
Rhinobatus, in ichthyology, the typical genus of *Rhinobatidæ*, with 12 species, from tropical and sub-tropical seas. Cranial cartilage produced into a long rostral process, the space between it and the pectoral being filled by a membrane. Dorsals without spine, both at a great distance behind the ventrals; caudal without lower lobe.

Rhinoceros, (1) the sole recent genus of the family *Rhinocerotidæ*. It falls naturally into three sections, which some zoölogists raise to the rank of genera.

(a) *Rhinoceros*.—Adults with a single large compressed incisor above on each side, occasionally a small lateral one, below a very small median, and a very large procumbent, pointed, lateral incisor; nasal bone pointed in front; single nasal horn; skin very thick, and raised into strong, definitely arranged folds. There are two well-marked species: (1) *Rhinoceros unicornis* (Linnaeus; *indicus*, Cuvier), now found wild only in the terai regions of Nepal and Bhotan and in Assam, though it had formerly a much wider geographical range; (2) *R. sondaicus* (or *javanus*, Cuvier), the Javan rhinoceros, is smaller and distinguished by the different arrangement

Rhinoceros

of the folds of the skin, and by the small size or absence of the horn in the female. Found near Calcutta, in Burma, Malay Peninsula, Java, Sumatra, and probably Bor-

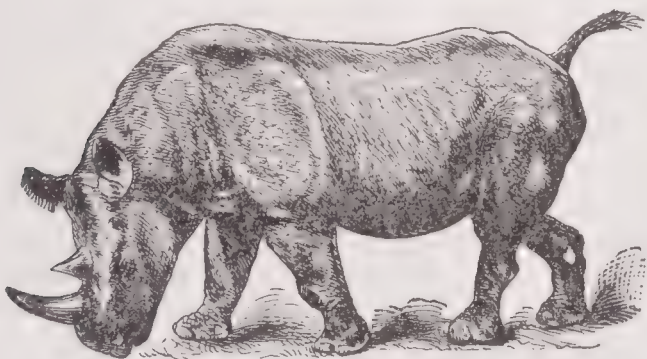


RHINOCEROS INDICUS.

neo. *R. unicornis* was known to the ancients, and was seen probably for the first time by modern Europeans when one was sent to the King of Portugal from India in 1513.

(b) *Ceratorhinus*.—The folds are not so strongly marked as in the first section. There is a well-developed nasal, and a small frontal horn, separated by an interval. The name, *R. sumatrensis*, has possibly been applied to more than one species, and two animals in the Zoölogical Gardens, Regent's Park, London, presented considerable differences of form and color. Sclater named one of them *R. lasiotis*, the hairy-eared rhinoceros. Geographical range nearly the same as that of the Javan rhinoceros, but it does extend into Bengal.

(c) *Atelodus*, with two well-marked species, peculiar to Africa. Incisors rudimentary or wanting, well-developed anterior and posterior horns in close contact; skin without definite permanent folds. *R.*



RHINOCEROS BICORNIS.

bicornis, the common two-horned rhinoceros, is the smaller, and has a pointed prehensile lip. It ranges from Abyssinia to Cape Colony, but the progress of civilization and the attacks of sportsmen are rapidly reducing its numbers. Two varieties are said to exist, *R. bicornis major* and *R. bicornis minor*. Specimens in which the posterior horn has attained a length as great as or greater than the anterior have

Rhinoplastic Operations

also been separated under the specific name of *R. keitloa*, but with scarcely sufficient reason. *R. simus*, Burchell's, the square-mouthed, or white rhinoceros, has a square truncated lip, browses on grasses and frequents open country. It is the largest of the family, an adult male standing over six feet at the shoulder. The epithet white is a misnomer, for the animal is a dingy slate-color. A local variety in which the horn has a forward rake is sometimes described as *R. oswellii*.

(2) Any individual of the genus rhinoceros. The rhinoceros is the largest and most powerful terrestrial mammal, except the elephant, to which, as well as to the hippopotamus and tapir, it is allied. They are of low intelligence, and usually harmless, but when provoked they display considerable ferocity, and, though apparently so clumsily formed, can run with great speed. Only one is produced at a birth. The flesh is sometimes used for food; in the East Indies, the skin, which is said to be bullet-proof at short distances, is used for shields, and in South Africa it is made into whips. *R. pachygnathus*, from the Miocene of Greece, was apparently intermediate between *R. bicornis* and *R. simus*. Four species, all bicorn, formerly inhabited Britain: *R. tichorhinus*, the woolly rhinoceros, from the brick-earths of the Thames valley; *R. hemitæchus* (Falc., *leptorhinus*, Owen), *R. megarhinus* (*leptorhinus*, Cuvier and Falc.), and *R. etruscus*, of Pliocene age. The one-horned Indian type was well represented (*R. sivalensis*, *R. palæindicus*) in the Pleistocene of the sub-Himalayan region. *R. schleirmacheri*, of the late European Miocenes, possessed incisors and was bicorn.

Rhinoplastic Operations. When a portion or the whole of the nose has been destroyed by accident or disease, the deficiency may be restored by a transplantation of skin from an adjoining healthy part. When the whole nose has to be replaced, the following course is usually adopted: A triangular piece of leather or gutta-percha is cut into the shape of the nose, and is extended on the forehead with its base uppermost; its boundaries, when thus flattened, are marked out on the skin with ink. Any remains of the old nose are then pared away, and a deep groove is cut round the margins of the nasal apertures. When the bleeding from these incisions has stopped, the marked portion of the skin of the forehead must be carefully dissected away, till it hangs by a narrow strip between the eyebrows. When the bleeding from the forehead ceases, the flap must be twisted on itself, so that the surface which was originally external may remain external in the new position, and its edges must be fastened

Rhinodon

with stitches into the grooves prepared for their reception. The nose thus made is to be supported with oiled lint, and well wrapped in flannel to keep up the temperature. When complete adhesion has taken place, the twisted strip of skin may be cut through, or a little slip may be cut out of it, so that the surface may be uniformly smooth. Either at the first operation or subsequently a new columna (the front part of the septum) is usually formed from the skin of the upper lip. When only a part of the nose, as one side only, or the septum, requires to be restored, modifications of the above operation are required, and the skin, instead of being taken from the forehead, is taken from the cheek or the upper lip. This operation is called the "Indian Method," having been introduced from the East and first successfully performed in Europe by Carpue in 1814. It has almost entirely superseded the "Taliacotian Operation," first performed by Tagliacozzi or Taliacotius (1546-1599), Professor of Anatomy and Surgery at Bologna, and described in his famous work, "Surgery of Mutilated Parts by Grafting" (1597). He took the skin for the new nose from the arm of his patient; and there is no reason why the operation which he describes, though inferior in many respects to that at present adopted, should not be successful. The difficulty and irksomeness of keeping the arm sufficiently long in apposition with the face (a period of about 20 days) is the chief objection to his method.

Rhinodon, in ichthyology, the sole genus of the family *Rhinodontidae*, with a single species, *R. typicus*, a gigantic shark, known to exceed 50 feet in length, and said to attain 70. Common in the W. parts of the Indian Ocean. It is harmless, the teeth being small and numerous, in broad bands. Snout broad, short, and flat; eyes very small.

Rhio, or **Riouw**, a seaport belonging to the Dutch, in the Indian Archipelago, on an islet 50 miles S. E. of Singapore. It consists of a European town, and a Chinese or native town, and having a capacious haven where large vessels find anchorage, carries on a considerable trade. It is the capital of a Dutch residency, comprising the islands of the Rhio Archipelago and other groups as well as districts on the E. coast of Sumatra. The population of the residency is estimated at 90,000. The Rhio Archipelago is a group of small islands lying chiefly S. and E. of Singapore. Chief island, Bintang.

Rhizanthæ, or **Rhizogens**, a remarkable group of plants, considered by Lindley as forming a separate class, which he places in a position intermediate between the Thallogens and the Endogens. It consists of

Rhizopoda

plants destitute of true leaves, but with short amorphous stems parasitical on roots, and is divided by Lindley into the three orders *Balanophoraceæ*, *Cytinaceæ*, and *Rafflesiaceæ*. By other botanists these orders are placed widely apart.

Rhizobolaceæ, the suwarro-nut order of plants, of which only a few species are known, consisting of large exogenous trees growing in the forests of South America. One of them (*Caryocar butyrosu*), a gigantic tree of Demerara, yields the suwarro, or souari nut, the kernel of which is esteemed as the most agreeable of the nut kind. The timber is used in shipbuilding.

Rhizogen, in botany, in Lindley's classification, the third of seven great classes of the vegetable kingdom. Parasitic plants with cellular scales instead of true leaves; stem an amorphous fungous mass, or a ramified mycelium sometimes destitute of spiral vessels. Color brown, yellow, or purple, never green. Flowers naked, or with a trimerous or pentamerous calyx with stamens and carpels. Most of them stain water a deep blood-red. They vary greatly in appearance. Brown, Griffith, and others, opposed their erection into a separate class, believing them degenerate exogens. Called also Rhizanth. Orders: *Balanophoraceæ*, *Cytinaceæ*, *Rafflesiaceæ*.

Rhizomania, in botany, an abnormal development of roots. It is often seen in the ivy, the laurel, the fig, the apple, etc. In the fig the roots are often sent out around the line which surrounds the stem; in the apple tree they appear in little bundles, absorb moisture, and decay. Rhizomania generally indicates something wrong with the ordinary root.

Rhizome, or **Rhizoma**, a rootstock, a prostrate, thickened, rooting stem which yearly produces young branches or plants. Examples, various *Iridaceæ* and epiphytous orchids.

Rhizophaga, root-eaters; a tribe of marsupials, with one family *Phascolomyidae*. Two scalpriform incisors in both jaws; no canines; stomach with a special gland; cæcum short, wide, with a vermiform appendage.

Rhizophora. mangrove; the typical genus of *Rhizophoraceæ*. Calyx four-parted; petals four, acute; stamens 8 to 12. The stem separates into roots some distance above the water. The wood of *R. mangle* is good and durable, the fruit sweet and eatable, and the fermented juice forms a light wine (see MANGROVE). The bark is good for tanning. Salt also is extracted from its aerial roots.

Rhizopoda, a name introduced by Dujardin for an order of Infusoria, which were defined as animalcules with mutable form,

Rhodes

moving by means of multiform exsertile processes, without vibratile cilia or other external organs. When the sub-kingdom Protozoa was formed, the name Rhizopoda was retained for the class containing individuals with the power of emitting pseudopodia, and the class was divided into five orders: *Monera*, *Amœbea*, *Foraminifera*, *Radiolaria*, and *Spongida*. The rhizopoda are the Myxopodia of Huxley, and this latter name has been retained by Professor Lankester in his reclassification of the Protozoa.

Rhodes, Mosheim, an American clergyman; born in Williamsburg, Pa., April 14, 1837; was graduated at the Theological Department of Susquehanna University, Selinsgrove, Pa., in 1861, and entered the ministry of the English Lutheran Church the same year. He held charges in Pennsylvania till 1869, and in St. Louis, Mo., after 1871. He was president of the General Synod of the Evangelical Lutheran Church in 1885-1886; president of the Lutheran Board of Education; trustee of the United Society of Christian Endeavor; member of the International Sunday-school Lesson Committee; and author of "Life Thoughts for Young Men" (1879); "Recognition in Heaven" (1880); "Expository Lectures on Philipians" (1882); "Life Thoughts for Young Women" (1883); "Vital Questions Pertaining to Christian Belief"; "Lenten Lectures on the Evidences"; "Throne of Grace" (1887); "Scriptural Giving" (1898); etc.

Rhoads, Samuel Nicholson, an American naturalist; born in Philadelphia, Pa., April 30, 1862; took a special course in journalism in Harvard University; and later studied at the Academy of Natural Sciences and Museum of Science and Art, in Philadelphia, and at Carnegie Museum, Pittsburg; and after 1893 traveled as a collector of museum specimens of natural history. He was a member of many associations, and wrote numerous papers on American and African mammals, and American birds, reptiles, and mollusks, in which about 100 new species and races of mammals and birds are described.

Rhodanthe, in botany, a genus of *Helychryseæ*; only known species *R. manglesii*, a beautiful composite; its flowers, of the dry and unfading kind, called everlasting, roseate or purple on the upper part, and silvery below. It is found in Western Australia, has been introduced into European and American greenhouses, and will grow also in the open air in a temperature between 60° and 80°. There are several varieties, but it is possible that two of these, *R. atrosanguinea* and *R. maculata*, are, as Paxton makes them, distinct species.

Rhode Island

* **Rhode Island**, a State in the North Atlantic Division of the North American Union; bounded by Massachusetts, Connecticut, Narragansett Bay, Block Island Sound, and the Atlantic Ocean; one of the original 13 States; capital, Providence; number of counties, 5; area, 1,053 square miles; pop. (1890) 345,506; (1900) 428,556; (1910) 542,674.

Topography.—The State is divided into two unequal parts by Narragansett Bay, which extends inland about 30 miles. The surface of the W. portion or mainland is hilly, but the hills are all low; the greatest height, Woonsocket Hill, having an altitude of 570 feet. There are numerous salt marshes along the ocean. The E. part consists mainly of islands. Of these the largest and most important is Rhode Island from which the State derives its name. Others are Canonicut, Hope, Patience, Starved Goat, Prudence, Perry, Dyer's, and Dutch Islands. The principal rivers are the Pawtucket, navigable as far as Pawtucket, where it changes its name to Blackstone, the Pawcatuck, forming part of the boundary between Rhode Island and Connecticut, and the Pawtuxet, flowing across the central part of the State, and emptying into the Providence river, an arm of the Narragansett Bay. There are numerous coves and bays branching off from Narragansett; among them being Greenwich Bay, Saxonnet river, Mount Hope Bay, and Providence river. Block Island, 10 miles from the coast, belongs to the State.

Geology.—The islands of Narragansett Bay are of Carboniferous origin and contain the extreme bed of anthracite in the United States. The W. part of the State and the E. shore of the bay are of Azoic formation, while Block Island belongs to the Tertiary era. The mineral resources of the State are not very extensive, though considerable anthracite coal, excellent for smelting purposes, and much magnetic iron have been mined at times. There are about 20 large granite quarries in the State; those at Westerly being noted for their value in monumental work. The value of the granite quarried in 1900 was \$444,316, an increase over that of the previous year of \$44,188.

Manufactures.—In common with New England States, Rhode Island is noted for its manufacturing interests. There were reported by the United States census in 1900, 4,189 manufacturing establishments, employing \$183,784,587 capital, and 96,528 persons; paying \$41,114,084 in wages and \$96,392,720 for raw materials; and having an annual output valued at \$184,074,378. The principal articles of manufacture are cotton goods, foundry and machine shop products, rubber boots and shoes, clothing, products, gold and silver, electrical appa-

* For Map. see MASSACHUSETTS.

Rhode Island

tus and supplies, bread and bakery products, files, flour and grist, carriages and wagons, jewelry, hosiery, malt liquors, masonry, oleomargarine, paints, plumbing, rubber and elastic goods, silk goods, packed meat, woolen and worsted goods.

Banking.—On Oct. 31, 1901, there were reported 38 National banks in operation, having \$13,105,250 in capital, \$6,317,750 in outstanding circulation, and \$4,503,000 in United States bonds. There were also 4 State banks, with \$495,000 capital and \$1,394,536 resources; 9 loan and trust companies, with \$3,670,498 capital, and \$3,013,391 surplus; and 25 mutual savings banks, with \$72,330,141 in deposits. The exchanges at the United States clearing house at Providence for the year ending Sept. 30, 1901, amounted to \$345,322,800; an increase over those of the preceding year of \$14,992,300.

Commerce.—The imports of merchandise at the ports of Bristol and Warren, Newport, and Providence for 1900 amounted in value to \$1,289,120; and the exports, \$10,429.

Education.—At the end of the school year 1899–1900 the children of school age numbered 102,250; the enrollment in public schools, 64,537; and average daily attendance, 46,087. There were 534 buildings used for public school purposes, public school property valued at \$5,175,045, and 1,913 teachers. For higher education there were 17 public high schools; 11 private secondary schools, the Rhode Island Normal School, and Brown University, at Providence, which is the principal educational institution in the State.

Churches.—The strongest denominations in the State are the Roman Catholic; Regular Baptist; Protestant Episcopal; Congregational; Methodist Episcopal; Free Will Baptist; Unitarian, and African Methodist. In 1899 there were 361 Evangelical Sunday-schools, with 6,327 officers and teachers, and 49,532 scholars.

Postoffices and Periodicals.—In 1901 there were 149 postoffices of all grades; and 58 periodicals, of which 12 were daily, 1 tri-weekly, 2 semi-weekly, 30 weekly, 1 bi-weekly, 11 monthly, and 1 quarterly.

Railroads.—On Jan. 1, 1901, the total length of railroads within the State was 223 miles.

Finances.—The total funded debt of the State, Jan. 1, 1902, was \$2,978,000; sinking funds, \$389,436.61; net debt, \$2,588,563.39. The sinking fund is largely invested in city town, and district bonds and notes, and is to receive \$32,000 yearly. The assessed valuation of real estate in 1900 was \$320,318,384; personal property, \$87,086,388; total, \$407,404,772; tax rate, \$1.80 per \$1,000.

Rhodes

State Government.—The governor is elected for a term of one year and receives a salary of \$3,000 per annum. Legislative sessions are annually, beginning on the first Tuesday in January and are not limited as to duration. The Legislature has 38 members in the Senate, and 72 members in the House, each of whom receives \$5.00 per day and mileage. There are 2 Representatives in Congress. The State government in 1904 was Republican.

History.—It is claimed that the Northmen visited this region about A. D. 1000, and certain antiquities have been ascribed to them, but the question of the location of Vinland seems never likely to be definitely settled. The first English settlement was made at Providence in 1636, by Roger Williams, whose religious opinions had caused his expulsion from Massachusetts. He and other settlers bought lands from the Indians, and an unwonted degree of religious toleration was established. The charter granted by Charles II. to the colony was so liberal in its provision that it remained the fundamental law of the State till 1842. Rhode Island was firm in opposition to the King Philip War, yet that State suffered more severely therefrom than any of her sister colonies. King Philip himself was killed in what is now the town of Bristol. The great "swamp fight" occurred in 1675, in the Narragansett country, where more than 1,000 Indians were killed. The charter was temporarily suspended from 1686 to 1687 by Sir Edmund Andros, who, however, was never able to gain possession of the original document. Andros was deposed in 1690, and a new government was immediately organized under the old form. This continued till, in 1841, a legally unauthorized people's convention met and framed a new constitution which action precipitated a crisis, culminating in the "Dorr rebellion," and the adoption of a new constitution in 1842, this going into effect in 1843. Under this charter suffrage was limited, about 9,500 men composing the electorate in 1840, out of a population of 109,000. The present suffrage laws were adopted in 1888. Rhode Island was the last of the States to ratify the Federal Constitution in 1790. It took an active part in the Revolutionary War, being long held by the English.

Rhodes, an island in the Mediterranean, appertaining to Asiatic Turkey, near the coast of Asia Minor; is 40 miles long, with a breadth of 18 miles at its widest point; area, 570 square miles; pop. about 30,000. It is traversed by a range of mountains, on which grow forests of pine, in great request for shipbuilding. Beneath this range rises a tract of lower hills, on which a species of the vine is largely cultivated, which

produces the perfumed wine so much praised by the ancients. The tract beneath forms the greatest portion of the island, and, sloping gradually down to the sea, is watered by numerous streams, which renders it capable of producing the most luxuriant crops. A great part of the island is uncultivated, but it yields corn, olives, pomegranates, lemons, wine, wax, honey, and figs. The manufactures are silk, shoes, red leather, and umber. Its exports are wax, honey, figs, and other fruits. Imports—colonial produce, woollens, iron, nails, shot, soap, cordage, hardware, coal, horses, cattle, carpets, and corn.

Rhodes, the capital of the island of Rhodes, situated at its N. E. extremity. It is defended by towers about 800 feet distant from each other, while in the center of the mole there is a square bastion 120 feet high. Rhodes presents at present very few vestiges of its ancient



COIN OF RHODES.

grandeur; its streets are narrow and winding, and devoid of elegance or regularity. It has two good harbors, separated only by a mole running obliquely out into the sea. The principal manufactures are red leather and shoes. It was at the entrance to the harbor of this city that stood the celebrated COLOSSUS OF RHODES (*q. v.*). Pop. about 10,000. The ancient Rhodes was taken possession of by a branch of the Doric race, who held it at the time of the Trojan war, 1184 B. C. It was of small political importance among the states of Greece till the city of Rhodes was built and made the capital of the island, 408 B. C. In the war between Cæsar and Pompey, the Rhodians, who had long held supremacy at sea, took part with the former 50 B. C.; and continuing their aid to Cassius, were defeated by the Romans and completely subjugated, 42 B. C. They then held their liberties by the caprice of the emperors, and their city was made, by Constantine I., the metropolis of the Provincia Insularum in 330. It was taken by Chosroes II., King of Persia, in 616; by the Saracens in 651; and by the Knights of St. John, Aug. 15, 1309 (see HOSPITALLERS). Mohammed II. besieged it ineffectually in 1480, and the Sultan Solymán I. compelled it to capitulate after a vigorous siege and brave defense that lasted from June to December, 1522. An earthquake which occurred in Rhodes, April 22,

1863, destroyed 2,000 houses, and swallowed up or otherwise killed and wounded thousands of the inhabitants.

Rhodes, Cecil John, a South African statesman; born July 5, 1853. He was the fourth son of the vicar of Bishop Stortford, Hertfordshire, England, and after attending the local grammar school was sent for his health to Natal, where his brother was a planter. He subsequently went to the Kimberley diamond diggings; there he soon became conspicuous and amassed a fortune. He came back to England and entered at Oriel College, Oxford, and though his residence was cut short by ill-health, he ultimately took his degree. He entered the Cape House of Assembly as member for Barkly. In 1884 General Gordon asked him to go with him to Khartum as secretary; but Rhodes had just taken office in the Cape ministry, and decided to remain in South Africa. He sent \$50,000 to Mr. Parnell to forward the cause of Irish Home Rule. In 1890 he became prime minister of Cape Colony; but even before this he had become a ruling spirit in the extension of British territory, and in securing the charter for the British South African Company. His policy may be described as the ultimate establishment of a federal South African dominion under the British flag, and, as one of the first steps toward the accomplishment of this scheme, he was an earnest advocate of the construction of a railroad "from Cairo to the Cape." He died in Cape Town, South Africa, March 26, 1902. In his will Mr. Rhodes left about \$10,000,000 to found a number of three-year scholarships tenable at Oxford, England. The income for each scholarship was \$1,500 a year, and two were offered to every State and Territory in the American Union, to every English speaking colony; while five were set apart for students of German descent.

Dying at the age of 49, Cecil Rhodes was one of the great figures of contemporary life; and, like all other great men, he has served as a text for the moralists. But, after all the morals are drawn from his career and the preachers have become silent, the fact stands out that he was a great man; and there is little illumination in the often-repeated reflection that he was a "typical man of his time," for so most great men have been. The more or less chance remark that he made—"What is the use of large plans unless you have the money to carry them out?"—has been taken as the key to his character; and the resolute quality of the man has been exaggerated in the obituary literature about him into a ruthless nature such as he hardly possessed.

He went as a youth to South Africa to escape consumption. By what seems an accident he found himself at Kimberley just

in time to take advantage of the newly discovered diamond fields. His constructive mind found opportunity to build a fortune. But if he had not, as it were, stumbled upon such a chance, it is conceivable that this same constructive quality might have found exercise in some other way and with other tools than wealth; for he cared nothing for fortune except as a tool. When he had acquired great wealth and great economic power, the task that dominated him was the development of South Africa and then of Larger Africa as a part of the British empire. To this he bent his whole energies. The large vision of the man enabled him to see far into the future; and his aim was to make sure that when the great undeveloped continent should become the home of civilization it should be English civilization. It is this patriotic cue—this race cue—that gives the true understanding of his character. He wished to do the work of an empire builder. The builders of empires have, sometimes by necessity and often by temperament, been men who were not squeamish about methods, especially methods of overcoming temporary difficulties. They subordinate the present to the future, the smaller work to the larger; and they ride rough-shod where gentler men with smaller plans go at a more consistent pace. Their contemporaries have just reason for moralizing and for complaint. But this type of man is, after all, the type that changes the map of the world and that often puts posterity under the greatest obligations to him. The one serious mistake made by Mr. Rhodes was his misjudgment of the Boers—a misjudgment that the English government accepted. But the great service that he rendered, which enormously outweighs all his mistakes, was in laying the secure foundations of English control over a large area of Africa. He so emphasized Africa as a desirable part of the British empire as to turn his wish into history. The personal characteristics of the man are worthy of study. The poor and somewhat weakly son of a village clergyman, with no equipment but that indomitable spirit which a long succession of great Englishmen have shown as the sufficient equipment for the mastery of the world, he kept before him the necessity of English rule as the first law of civilization. But he never outgrew the traditional and even the sentimental inheritance of his early village period. He cut a somewhat awkward figure on every plane except the plane of large action and quick decision. He kept his simple tastes and habits. He never even learned to dress. There was an unlordliness about him and a certain childishness that gave no hint of his power as a man of action. Those who knew him best say that it was difficult to believe him a great man except when you

looked at the map of Africa. His career had a larger effect on the English imagination because of the distance from London of his place of activity. He was the great and successful adventurer of his generation, to whose achievements distance lent the old enchantment; and he belongs in that long line of great English adventurers whose work has made the modern world what it is.

Mr. Rhodes' will gave the world a clearer idea of the man than any revelation that he made of himself during his lifetime, especially his bequest of liberal scholarships at Oxford, to be given to selected young men from the British colonies, from every State and Territory in the United States and from Germany. His conviction was that "a good understanding between England, Germany, and the United States will secure the peace of the world, and educational relations form the strongest tie."

Along with this must be read Mr. Rhodes' method whereby he wished the young men to be chosen who should hold these scholarships. In selecting them he wished "literary and scholastic attainments" to count for four-tenths in their rating; "a love for and success in manly outdoor sports" for one-tenth; "qualities of manhood such as truth, courage, devotion to duty, sympathy for and protection of the weak, kindness, unselfishness, and fellowship," to count for three-tenths; "exhibition of moral force of character and instincts to lead and to take interest in" his fellows, for two-tenths. Now there may be a better way of rating young men than this; but if there be, it is not a part of popular knowledge. It is both shrewd and accurate, and it is an advance over the too prevalent method of judging youth for academic distinction solely on a record of scholarship. In other words, Mr. Rhodes saw clearly that the great fact of the modern world was the leadership of the English, and his wish was for the unification of the English in every land—not a definite political union (which as democratic institutions develop more and more becomes a matter of detail and a matter of little importance, even if it were practicable)—but a world—encompassing large unity of purpose, to spread and to keep English rule, English thought, English ways. And this was his method of doing it—to keep at one of the great English universities a succession of selected youth who show vigorous physical and moral and intellectual qualities.

Rhodes, William Barnes, an English dramatic writer; born Dec. 25, 1772. He is famous as the author of a long popular burlesque, "Bombastes Furioso," produced anonymously at the Haymarket Theater in 1810, and published first at Dublin in 1813. Since then it has passed through many edi-

tions. He also wrote "The Satires of Juvenal Translated into English Verse" (1801), and "Epigrams" (1803). He died Nov. 1, 1826.

Rhodesia, the name given to that part of South Africa which has been occupied of recent years by the British South African Company, acting mainly under Cecil John Rhodes. It is bounded on the E. by Portuguese East Africa, on the W. by Angola and German Southwest Africa, on the N. by German East Africa and the Kongo Free State, and on the S. by Bechuanaland and the Transvaal. Area, 257,575 square miles; pop. 1,023,250. The whole territory is administered by the British South African Company, which was given a royal charter in October, 1889. The river Zambesi flows through it, cutting the region into two portions—Southern and Northern Rhodesia.

Southern Rhodesia.—Southern Rhodesia consists of the two provinces of Matabeleland and Mashonaland. Mashonaland is bounded on the N. by a line running roughly in a S. E. direction from Zambo, on the Zambesi, to the intersection of the river Mazoe with lon. 33° E., on the S. W. by Matabeleland, and on the E. by the Portuguese province of Lorenzo Marques. The capital and the seat of government of Rhodesia, is Salisbury, with a population of 1,800. The other principal townships are New Umtali, Melsetter, and Enkeldoorn. A railway is being built, running inland toward Salisbury from Beira on the coast. Its completion will place Salisbury in direct communication with the sea over a line 382 miles in length. It is then proposed to connect Salisbury with Bulawayo. The African Trans-Continental Telegraph Company has constructed a line between Umtali and Tete, and from there on to Blantyre in British Central Africa, and to Zomba, Fort Johnston, Kota Kota, on the W. shore of Lake Nyassa, and Karonga, at the N. W. end of the lake. The survey on to Lake Tanganyika is practically completed. Matabeleland lies between the Limpopo and middle Zambesi rivers, and is bounded on the N. E. by Mashonaland and on the S. by the Transvaal and Khama's country. The principal town, and the chief commercial center in Rhodesia, is Bulawayo, with a population of 5,000. Telegraphic communication exists between Cape Town, Bulawayo and Salisbury, and in the Bulawayo district the telegraph system has been considerably extended. Bulawayo has also telephone communication with the principal stations. The extension of the Cape government W. railway system through Kimberley and Vryburg to Bulawayo was completed in October, 1897, and officially opened Nov. 4.

The distance from Cape Town to Bulawayo is 1,360 miles.

Northern Rhodesia.—Northern Rhodesia consists of the whole of the British sphere N. of the Zambesi, lying between Portuguese East Africa, German East Africa, the Kongo Free State, and Angola, with the exception of the strip of territory forming the British Central Africa Protectorate, which is under direct imperial administration. N. of the Zambesi the country has as yet been little prospected. Coal has been found on the shore of Lake Nyassa. The North Charterland Exploration Company, which holds a grant of 10,000 square miles N. of the Zambesi, is engaged in trading, agriculture, and stock-breeding operations. A new industry has lately been started in fiber, on which the representative of a large London company has been experimenting with satisfactory results.

There are 5,250 square miles of gold fields in Rhodesia; the total output of the mines from September, 1898, to May, 1900, both inclusive, was 113,160 ounces. Public roads, have been made to the extent of over 2,200 miles, and telegraph lines to the extent of 2,536 miles of line, with 75 telegraph offices. The rinderpest, which for several years has been devastating Africa, traveling slowly through the continent from N. to S., made its first appearance in Matabeleland in February, 1896. The adoption of the drastic regulations which the administration decided to enforce had to some extent checked the progress of the epidemic, when the outbreak of the Matabeleland rebellion put a stop to all precautionary measures. The effects of the disease have been far-reaching, and, apart from considerations of human life, have been more disastrous than those of the native rebellion. During the 12 months succeeding the outbreak of the rebellion, agriculture was practically at a standstill. Since the pacification of the country considerable tracts of land have been placed under cultivation, and fresh stock, including Angora sheep and Merino goats, is being imported. Throughout the country the conditions of soil and climate are suitable for all kinds of European cereals and vegetables; and, in addition, many trees, shrubs, and plants peculiar to subtropical regions, can be successfully cultivated. Good results have already been obtained from the introduction of fruit and other trees. Tobacco occurs in a wild state, is grown universally by the natives, and has been produced of excellent quality by white farmers in several districts. India-rubber, indigo, and cotton are similarly indigenous, and will probably well repay cultivation. The Rhodesian forests produce abundance of hard timber of fine quality, and a company is working this industry with a view to meeting the large de-

Rhodesia

mand for building and other purposes in Salisbury and Bulawayo. In addition to gold, silver, copper, coal, tin, plumbago, antimony, arsenic and kieselguhr have been discovered. The arrival of the railway at Bulawayo has given an impetus to the mining industry. In Southern Rhodesia a company is being formed to develop the india-rubber industry on a large scale.

The following special report by Ernest L. Hayes, United States Consular Agent at Eibenstein, under date of Oct. 18, 1901, briefly reviewed Rhodesian conditions at that time: Situated in the heart of the Dark Continent, bounded on every side by the colonies of Great Britain, France, Germany, Portugal, and Belgium, lies a country as yet but little known, controlled by a great stock company famed for its commercial and political enterprises in South Africa. The Chartered Company, with a capital of \$22,000,000, is to Rhodesia what the East India Company was once to India. Rhodesia is divided into two parts—Mashonaland and Matabeleland S. of the Zambesi and Northeast and Northwest Rhodesia N. of that river. The whole country is extraordinarily rich in mineral treasures. Apart from the gold mines, which, in spite of the war and scarcity of labor yielded during 1900, nearly 166,000 ounces, there are silver, copper, tin, antimony, arsenic, lead, and coal.

Railroad building in Rhodesia, according to German reports, is making rapid progress. The stretch from Bulawayo N. to Salisbury will soon be completed, thus connecting Cape Town by rail with Beira, the seaport town of Portuguese Gasaland. The great Cape-Cairo railway, planned by Cecil J. Rhodes, an enterprise of immense importance to all Africa, will intersect Rhodesia from N. to S. There are already some 3,000 miles of roadway with intervening cart roads, built in South Rhodesia. In regard to agriculture, much remains to be done. The rich soil is eminently adapted to growing corn, oats, potatoes, tobacco, and even coffee. The vast territory adjacent to the headwaters of the Zambesi and its tributaries forms the Mississippi valley of Africa. It has a great future, and the next 10 years will witness a large emigration, not only to Rhodesia, but to England's other South African colonies as well. It will be the policy of the Chartered Company and of the British government to encourage English settlers to locate in these colonies. The discovery of gold in South Africa induced many Americans to locate on the Rand. The opening up of vast tracts of land favorable of farming may produce similar results. After the war is over, there will be a great demand for the corn planters, harrows, cultivators, reapers, mowers, hayrakes, seeders, plows, disks, thrashers,

Rhododendron

cornshellers wagons, carriages, carts, harness, saddles, windmills, and every other piece of machinery or utensil necessary to run a farm. American farm machinery is admittedly the best in the world and a farmer having once used the same will buy no other, if he can get it. South Africa as a farming country has a future, and the British government, from a political point of view, will make doubly welcome settlers of the English-speaking race.

Rhodian Law, an early system of marine law, said to have been compiled by the Rhodians after they had obtained the sovereignty of the sea. The only rule that we know now, though the entire code was adopted by the Romans under Antonius Pius, is the principle of general average: "If a cargo be jettisoned to lighten the ship, all contribute to make good the loss incurred for the benefit of all." The mediæval naval law of the Rhodians was not of Rhodian origin. It consisted of four distinct parts, of very different dates, but mostly of practical value.

Rhodium, one of the rare metals found in platinum ores. It is very hard, white, and brittle, and, with the exception of iridium, one of the most infusible of metals. When pure, it is insoluble in acids, but when alloyed with platinum, bismuth, or copper, it is dissolved with them in aqua regia. Heated in contact with chloride of sodium in a current of chlorine, the double chloride of rhodium and sodium is formed. The only use to which rhodium has been applied, is to form the nibs of metallic pens, for which it is extremely well fitted, from its hardness and unalterability. It forms four definite oxides— RhO , Rh_2O_3 , RhO_2 , and RhO_3 . The first two are insoluble in the strongest acids. Rhodium forms two sulphides, RhS and Rh_2S , and one chloride, Rh_2Cl_6 . Rhodium was discovered by Wollaston in 1804, associated in small quantity with native platinum. The salts formed by the chloride crystallize in cubes of a delicate rosy hue, hence the name.

Rhodium Oil, a balsamic volatile oil obtained from Canary Island rosewood, the woody root of *Convolvulus scoparius* and *floridus*. It is employed as a perfume, but there is also an artificial perfume so called.

Rhododendron, a genus of trees and shrubs of the natural order *Ericaceæ*, having 10 stamens, a very small calyx, a bell-shaped or somewhat funnel-shaped corolla, and a capsule splitting up through the dissepiments. The buds in this and nearly allied genera, as azalea are scaly and conical. The species are numerous; they have evergreen leaves, and many of them are of great beauty both in foliage and in flowers. A few small species are natives of continental Europe and of Siberia; but the

Rhododendron

greater number belong to the temperate parts of North America, and to the mountains of India. *R. maximum*, so designated when the far larger Indian species were unknown, is common in Great Britain as an ornamental shrub. It is a large shrub or small tree, which forms impenetrable thickets on many parts of the Allegheny Mountains, and has a magnificent appearance when in flower. The leaves are large, oblong, acute, stalked, leathery, dark green and shining above, rusty brown beneath. The flowers are large, in umbellate corymbs, varying in color from pale carmine to lilac. This species is quite hardy in Great Britain; as is also *R. ponticum*, a very similar species, with narrower and more pointed leaves, which are of the same color on both sides, a native of Western Asia, and apparently also of the S. of Spain. *R. catawbiense*, a native of the S. parts of the Alleghenies, with large purple flowers; *R. Caucasicum*, the name of which indicates its



RHODODENDRON.

origin; and *R. arboreum*, a native of Nepal, with very dense heads of large scarlet flowers, and leaves 4-6 inches long, attaining in its native country a height of 30 or 40 feet, are also fine species, and well known. Most of the extremely numerous varieties now common in our gardens and shrubberies have been produced from them by hybridizing or otherwise.

Many splendid species of rhododendron were discovered in the Himalayas, the Khasia hills, and other mountainous parts of India, by Dr. Hooker and others; and many of them have been introduced into cultivation in Europe. *R. Falconeri* is described as in foliage the most superb of all, the leaves being 18 or 19 inches long. It is a tree 30 to 50 feet high, with leaves only at the extremities of the branches. It grows in Eastern Nepal at an altitude of 10,000 feet. *R. argenteum* has flowers $4\frac{1}{2}$ inches long, and equally broad, clustered, and very beautiful. *R. Maddeni*, *R. Aucklandii*, *R. Edgeworthii*, and others have white flowers. *R. Dalhousiæ* is remarkable

Rhodonite

as an epiphyte, growing on magnolias, laurels, and oaks. It is a slender shrub, bearing from three to six white lemon-scented bells, $4\frac{1}{2}$ inches long, at the end of each branch. *R. Nuttali* has fragrant white flowers, said to be larger than those of any other rhododendron. All these belong to the Himalayas. In more S. latitudes, as on the Neilgherry Hills and on the mountains of Ceylon, *R. nobile* prevails, a timber tree 50 to 70 feet high, every branch covered with a blaze of crimson flowers. *R. Keysii* and *R. Thibaudiense*, also natives of the N. of India, have flowers with nearly tubular corolla. *R. ferrugineum* and *R. hirsutum* are small species, shrubs from 1 to 3 feet in height, natives of the Alps and among the finest ornaments of alpine scenery. They are called *Alpenrose* (Alpine rose) by the Germans. They have small carmine-colored flowers in umbellate clusters. The mountain slopes glow with their blossoms in July and August. The flora of the Himalayas contains a number of similar small species. *R. anthopogon* and *R. setosum*, dwarf shrubs with strongly-scented leaves, clothe the mountains in Eastern Nepal, at an elevation of 12,000 feet and upward, with a green mantle, brilliant with flowers in summer. *R. nivale* is the most alpine of woody plants, spreading its small woody branches close to the ground at an elevation of 17,000 feet in Sikkim. *R. lapponicum*, a procumbent shrub, with small flowers, grows as far N. as human settlements have reached in Europe, Asia, and the United States. Some of the species of this genus possess narcotic properties. An oil obtained from the buds of *R. ferrugineum* and *R. hirsutum* is used by the inhabitants of the Alps, under the name *Olio di Marmotta*, as a remedy for pains in the joints, gout, and stone. *R. chrysanthum*, a low shrub, with golden yellow flowers, a native of Siberia, is also used in gout and rheumatism. *R. cinnabarinum*, a Himalayan species, poisons goats which feed on it, and when used for fuel causes inflammation of the face and eyes. But the flowers of *R. arboreum* are eaten in India, and Europeans make a palatable jelly of them.

Rhodonite, a mineral crystallizing in the triclinic system, through its angles approximate to those of pyroxene; hardness, 5.5-6.5; sp. gr., 3.4-3.68; luster, vitreous; color, shades of red; some varieties, greenish, yellowish; streak, white, very tough. Composition: Silica, 45.9; protoxide of manganese, 54.1=100, represented by the formula, MnOSiO_2 ; the manganese is frequently partly replaced, however, by protoxide of iron, lime, and sometimes zinc. Dana distinguishes three varieties: (1) Ordinary, (a) crystallized, (b) granular, massive; (2) Calciferous (Bustamite),

Rhodope

which contains from 9 to 15 per cent. of lime; (3) Zinciferous (Fowlerite).

Rhodope, the ancient name of a mountain chain (7,474 feet) extending along the borders of Macedonia and Thrace. The Turks call it Dospad Yailasi, the Bulgarians Despoto Dag, both titles having reference to the numerous (Greek) monasteries that stud its sides. Of these the most famous is the vast fortress-monastery of Rilo, in the N. W. of the range, standing on its S. side in the midst of magnificent pine forests. Rilo has for generations been the focus of the national Bulgarian Church and the mainstay of Bulgarian nationality.

Rhomb, or **Rhombus**, in geometry, an oblique parallelogram whose sides are all equal. The diagonals of a rhombus bisect each other at right angles. The area of a rhombus is equal to half the product of its diagonals.

Fresnel's rhomb, in optics, is an apparatus for converting plane into circularly polarized light. It is a parallelopiped of glass, of such length and angles that a ray of light entering one small end at right angles, twice suffers total reflection within the rhomb at an angle of about 54° (depending on the polarizing angle of the glass), and finally emerges at right angles from the opposite small end. When the beam of light is plane polarized, and the rhomb is so arranged that its reflecting faces are inclined at an angle of 45° to the plane of polarization, the beam emerges circularly polarized.

Rhône, a department of France, part of the former Lyonnais; area 1,077 square miles; pop. (1906) 858,907. It lies almost wholly in the basin of the Rhone and the Saône, its E. boundary being formed by these rivers. The surface is almost entirely hilly, being broken up in all directions by low spurs of the Cévennes. Corn, potatoes, wine, and fruits are the principal products. Nearly one-half the area is cultivated, one-eighth is vineyards, one-ninth under forest, and nearly one-sixth meadows. About 13,000,000 gallons of wine are made annually. The department is industrially one of the most important in France; all the branches are carried on at LYONS (*q. v.*), the capital of the department.

Rhône (Latin, *Rhodānus*), a river in Europe which rises in Switzerland, near the E. frontiers of the canton of Valais, about 18 miles W. S. W. of the source of the Vorder-Rhein. Its precise origin is the Rhône Glacier, 5,581 feet above the level of the sea. It passes through the Lake of Geneva, and enters France, flowing first S. and then W. to the city of Lyons, where it turns almost due S., and so continues till (after passing Avignon and Arles) it falls into the Gulf of Lyons by a greater and smaller mouth, forming here an extensive

Rhus

delta (see CAMARGUE). Its principal affluent is the Saône, which enters it at the city of Lyons; other large tributaries are the Isère and Durance. Its whole course is about 500 miles; its drainage area is 38,000 miles; and it is navigable for 360 miles. The great obstacles to its navigation are the rapidity of its current, the shifting character of its channel, and the variations that take place in the volume of its water; but these obstacles have to a great extent been removed by a scheme of regularization and canalization, intended to secure everywhere a depth of over five feet. By means of a series of magnificent canals the navigation of the Rhône has been continued, without interruption, to the Rhine (through the Saône), Seine, and Loire, and to the Meuse and the Belgian system.

Rhopalodon, in palæontology, a genus of Dinosauria, of Permian age, from a mine on the banks of the Dioma river, Orenburg, Russia. It was founded on a fragment of a lower jaw, containing nine teeth not unlike those of *Iguanodon*. There is but one species, *R. wangenheimii* (named in honor of its discoverer). *R. mantelii* (F. de Waldheim) = *Iguanodon mantelii*.

Rhubarb. See RHEUM.

Rhus, in botany, a genus of *Anacardiaceæ*. Leaves simple or compound. Flowers in axillary or terminal panicles, bisexual or polygamous. Calyx small, persistent, five-partite; petals five; stamens five; ovary one-celled, sessile; fruit a dry drupe, with one exalbuminous seed. Nearly 100 species are known. Most are shrubs, from 6 to 10 feet high. They exist in all the continents. The leaves of *R. coriaria*, the hide or elm-leaved sumach of the S. of Europe, are used for tanning morocco leather. In the Himalayas those of *R. cotinus* are similarly employed. The fruit of the former was given in dysentery. In India, *R. parviflora*, *R. semialata*, *R. succedanea*, are used medicinally. Exudations from incisions in the bark of *R. succedanea* and *R. varnicifera* yield the varnish used in Japanese and Chinese wickerwork. The former produces astringent galls, and its seeds yield a kind of wax; as do also those of *R. wallichii* and the Japanese *R. varnix*. The juice of the latter species blisters the skin. The Turks used the acid fruits of *R. coriaria* to sharpen their vinegar. The plant yields sumach. The bark of *R. glabrum* is a febrifuge, and is employed as a mordant for red colors. *R. metopium*, a Jamaica plant, yields a medicinal gum. *R. toxicodendron* (used in pharmacy as a topical irritant) and *R. venenata*, American species, are poisonous, nor is any of the genus very safe. These two species are called indifferently poison oak, poison ivy, poison sumac, and more rarely mercury.

Rhyme

The wood of *R. collinus* is employed for inlaid and cabinet work.

Rhyme, more correctly RIME, in poetry, a correspondence in sound of the terminating word or syllable of one line of poetry with the terminating word or syllable of another. To constitute this correspondence in single words or in syllables it is necessary that the vowel and the final consonantal sound (if any) should be the same, or have nearly the same sound, the initial consonants being different. English writers have allowed themselves certain licenses, and we find in the best English poets rhymes which strike an accurate ear as incorrect, such as sky and liberty, hand and command, gone and alone. Such rhymes may be tolerated if they only occur at rare intervals, but they must certainly be regarded as blemishes. If the rhyme is only in the last syllables, as in forgave and behave, it is called a single rhyme; if in the two last syllables, as bitter and glitter, it is called a double rhyme; if in the last three syllables as callosity and reciprocity, it is called a triple rhyme. This last sort of rhymes is principally used in pieces of a comic or conversational character. Rhymes which extend to more than three syllables are almost confined to the Arabians and Persians in their short odes (gazelles), in which the same rhyme, carried through the whole poem, extends sometimes to four and more syllables. The modern use of rhymes was not known to the Greeks and Romans; though some rhymed verses occur in Ovid. It has been used, on the other hand, from time immemorial among the Chinese, Hindus, Arabs, and other Oriental nations. Rhyme began to be developed among the western nations in the Latin poetry of the Christian Church. It is found used as early as the 4th century. The early English, German, and Scandinavian poems are distinguished by alliteration instead of rhyme (see ALLITERATION). The Troubadours first attempted a variety of artificial combinations of rhyme in the sonnet, canzone, etc., and the Spaniards and Italians, with their musical languages and delicacy of ear perfected the forms of involved rhyme.

Rhymer, Thomas, of Erceldoune, or Earlston, Berwickshire, England, otherwise called THOMAS THE RHYMER; a half-legendary Scotch poet or romancer of the 13th century. He is mentioned by Barbour, Blind Harry, and Wyntoun, was credited with prophetic powers, and his "Prophecies," a collection of oracular rhymes, were long popular in Scotch folk lore. The old metrical romance of "Sir Tristram" is doubtfully ascribed to him.

Rhynchocyon, in zoölogy, a genus of *Macroscelididae*, with one species, *R. cernei*, from the coast of Mozambique. It is about

Rhytina

eight inches in length, exclusive of the rat-like tail; the muzzle is produced into a long, movable snout; fur rusty-brown, blackish on head and neck, with light reddish spots on hinder part of back. It lives in holes in the ground, and comes out at night to feed on insects. The hind limbs are not so disproportionately long as in the true jumping shrew; all the feet are four-toed, and the dentition is anomalous.

Rhynchonella, in zoölogy, the typical genus of *Rhynchonellidae*. Shell trigonal, acutely beaked, usually plaited; dorsal valve elevated in front; ventral flattened, or hollowed along the center. Known recent species four, from the North Polar regions and New Zealand. Known species 332, from the Lower Silurian onward. Found in Europe, Asia, and North and South America.

Rhys, John (rīs), a Celtic philologist; born in Abercaero, Cardiganshire, Wales, June 21, 1840. He was Professor of Celtic in Oxford from 1877 and principal of Jesus College from 1895; works: "Lectures on Welsh Philology" (1877); "Celtic Britain" (1882); "Studies in the Arthurian Legends"; etc. Knighted in 1907.

Rhythm, in general a measured succession of divisions or intervals in written composition, music, or dancing. The rhythm of poetry is the regular succession of accent, emphasis, or voice stress; or a certain succession of long and short (heavy and light) syllables in a verse. Prose also has its rhythm, and the only difference (so far as sound is concerned) between verse and prose is, that the former consists of a regular succession of similar cadences, divided by grammatical pauses and emphases into proportional clauses, so as to present sensible responses to the ear at regular proportioned distances. In music, rhythm is the disposition of the notes of a composition in respect of time and measure; the measured beat which marks the character and expression of the music.

Rhytina, in zoölogy, a recently extinct genus of *Sirenia*. Edentulous, mastication being performed by horny oval plates; head very small in proportion to body; tail with two lateral pointed lobes; pectoral limbs small and truncated; skin naked, covered with a thin, hard, rugged, bark-like epidermis. Only one species is known, *R. stelleri*, the N. sea cow. It was discovered by Steller, a German naturalist, in the Russian service, in 1741, and was then extremely abundant round Bering and Copper Islands in the North Pacific. The last was supposed to have been killed in 1768, but Nordenskjöld obtained information from the natives of Bering Island which led him to believe that a few individuals may have survived to a much later date, even to 1854. The habits of the rhytina were sim-

Riall

flar to those of the manatee, which it greatly exceeded in size, attaining a length of about 25 feet. Steller published an excellent account of its anatomy and habits, and quantities of its remains have since been discovered. It occurs in the Post-Pliocene of Siberia.

Riall, Sir Phineas, a British military officer; born in England about 1769; entered the army as ensign in 1794 and rose to the rank of major in the same year. In 1797 he was reduced in rank and was on the reserve list till 1804. He was in command of a brigade in the West Indies in 1808-1810; took part in the expeditions against Martinique and Saintes, and in the capture of Guadaloupe; became colonel in 1810 and Major-General in 1813; and later was ordered to Canada to take part in the war between Great Britain and the United States. He served on the Niagara frontier; and was chief in command at the battles of Chippewa and Lundy's Lane. He was appointed governor of the Island of Grenada in 1816; was promoted Lieutenant-General in 1825 and full General in 1841; and was knighted in 1833. He died in Paris, France, Nov. 10, 1851.

Rib, in anatomy, one of the long curved bones which form the walls of the chest. They extend in an oblique direction from the vertebræ of the back to the sternum in front. There are usually 12 on each side; but in some rare cases 13 have been found, in others only 11. They are distinguished into "true" and "false"; the former being the seven upper ribs, which are articulated to the sternum; the latter the five lower ones, which are not immediately attached to that bone. The use of the ribs is to cover and defend the lungs and heart; and their articulations with the vertebræ and sternum admitting of a slight motion, they assist in respiration. See ANATOMY: THORAX. In shipbuilding, one of the timbers of a ship, which have their base in the keel as a backbone, and serve to maintain generally the cavity of the vessel. In architecture, one of the curvilinear timbers to which, in an arched or covered plaster ceiling, the laths are nailed. In botany, the principal vein or nervure which proceeds from the petiole into the blade of a leaf. In mining, a pillar of coal left for the support of the roof of a mine.

Ribadoquin, or **Ribaudequin**, a mediæval engine of war, consisting of a kind of war chariot fortified with iron spikes, placed in front of an army arrayed for battle. In the 14th century they were furnished with small cannons. Also the name of a powerful crossbow for throwing long darts.

Ribbon, **Riband** or **Ribband**. The principal ribbon manufacturing center is Coventry, England, St. Etienne, France, Ba-

Ribbon

sel, Switzerland, and the middle Rhine. Ribbons were also formerly made in Derby and Leek, England. In Coventry the ribbon industry was begun at the beginning of the 18th century. Among the various kinds of ribbons woven in Coventry are the following: Taffeta, gros-grain, twill, satin, satinette, ottoman-satin, and terry, plush, brocade faille, plaids, watered satins, birthday ribbons and book-markers, sarsnets, Orientals, waistbands, and other plain and figured narrow fabrics. Of the names which indicate the kind of ground-work, gros-grain is a ribbed silk; plush, a velvety or pile surface; satin, a smooth polished surface, etc.; and there are mixtures of these various fabrics, generally woven in stripes, faille with satin, satin with terry, velvet with satin, plain and figured in conjunction, making an infinite variety of decorative effects both in weaving and color.

The construction of a fabric of a ribbon is like that of broad silks — viz., the threads or warp (French, *chaine*) lengthwise; those at right angles, or shot across the ribbon, the shute or weft (French, *trame*). The warp consists of many threads, the shute which interweaves the warp of one, or at most a few only, according to the number of colors or style of fabric required. There are two kinds of looms or methods of weaving, hand looms and power looms, the latter having gradually but surely superseded the former, except for very artistic work. These two looms are also of two kinds, those which weave plain goods and those which weave figured or patterned work. The latter are called Jacquard looms (see WEAVING); in these every warp thread is so isolated as to be under mechanical control, and can be raised or not independently of every other thread. These warp threads are raised by means of the "harness" to allow of the shute to pass between the whole or parts of the warp threads according to the pattern or style required. The harness is composed of "leishes," the purpose of which is to raise at will the warp threads, each of which requires one leish. The term "shed" is applied to the warp when separated horizontally by the harness for the shuttle to pass between; this is called the "opening," that in the upper surface being termed the top shed, and the lower part the bottom shed. The shuttle contains the quill in which has been wound the "filling," which is a portion of the shute or weft thread, and is propelled in the shuttle between the warp threads by hand or by other power, generally steam power. In front of this complicated mechanism is the "slay" or "reed," which is a comb-like apparatus through which the warp threads pass before they receive the shute into its resting place in the fabric. The Jacquard arrangement

Ribbon Brake

is placed on the top of the loom, and consists of perforated cards, with the requisite machinery to work them. See **SILK**.

Ribbon Brake, a form of brake having a band which nearly surrounds the wheel whose motion is to be checked. One arm is made fast and the other is attached to the short arm of a bent lever, by means of which it may be at once applied to the greater part of the periphery of the wheel, exerting a frictional pressure proportionate to the force applied to the lever.

Ribbon Fish, the *Regalecus banksii*, known also as the oar-fish. Its length is about 12 feet; color silvery, with irregular dark lines and spots on the anterior part of the body; dorsal red; snout truncated, mouth edentate, stomach prolonged as a pouch. Ribbon fishes, the acanthopterygian division Taniiformes.

Ribbon Grass, *Phalaris arundinacea*, a species of canary grass with variegated leaves.

Ribbonism, the name assumed by a group of secret associations among the lower classes in Ireland throughout the half century extending from 1820-1870, at its greatest height from about 1835 to 1855. Its origin and organization are alike wrapped in obscurity, but it appears in the beginning at least to have been political in its aims, and it seems probable, that it grew out of the northern Defenders who banded themselves to oppose the Orange organization. Earlier associations with somewhat similar aims were the Whiteboys and the Threshers, and, in particular corners of the island, the Carders, Shanavests, and Caravats.

Ribbonism, according to O'Connell, was more political in the N., in presence of the organization of the Orange lodges; in the S. it flowed rather into what he characterized as "driftless acts of outrage." Though everywhere condemned by the Roman Catholic clergy, it included none but Roman Catholics within its numbers, and it maintained its influence by a system of oaths and secret signs and passwords. Of these many were made known to the authorities by informers, but they were found to contradict completely rather than merely differ from each other. One striking feature of Ribbonism, as distinguished from most Irish patriotic associations, was the fact that its adherents belonged exclusively to the very lowest and most ignorant classes, the humbler peasantry, farm servants, laborers, and petty shopkeepers, hardly even the smallest farmers or their sons apparently belonging to it in any part of Ireland. So far as there was any unity in its aims, it aimed at making itself a public conscience on all agrarian questions; but, as A. M. Sullivan pointed out, the Ribbonism of one period and of one district was

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not the Ribbonism of another. "In Ulster it professed to be a defensive or retaliatory league against Orangeism. In Munster it was at first a combination against tithe-proctors. In Connaught it was an organization against rack-renting and evictions. In Leinster it often was mere trade unionism, dictating by its mandates and enforcing by its vengeance the employment or dismissal of workmen, stewards, and even domestics. This latter phase generally preceded the disappearance of the system in a particular locality, and was evidently the lowest and basest form to which it sank or rotted in decay."

The name, which of course originated in a green badge worn by the members, does not appear to have been attached to it till about 1826; and its influence seems to have grown gradually till about 1855, from which time it began rapidly to decline before a healthier public opinion and a growing political intelligence that recognized the greater advantage of more open and legitimate agitation. Here and there traces of a demoralized Ribbonism survived, capable of an occasional outbreak into malignant crime, but its declaration as illegal by the Westmeath Act of 1871, was hardly better than a mere flogging of the bodies of the slain.

Ribbon Worms, a group of annuloid animals belonging to the sub-order *Nemeritida*, a division of the order *Turbellaria* of the platyhelminia or "flat worms." The leading characteristics of ribbon worms are an elongated worm-like body, an alimentary canal terminating in a distinct anus, and a protrusible proboscis. These forms are marine in habits, and are not parasitic. The sexes are generally separate, and reproduction may be subserved by ova, by gemmation or budding, or by division of the body substance.

Ribeiro, Bernardim, a Portuguese poet; born in Tarrao, province of Alemtejo, in 1486 (?). He is a noteworthy figure in Portuguese literature, having been one of the men who introduced the Italian pastoral style that has ever since prevailed in Portugal. Of his works there are now extant five idyls, a pastoral romance in prose, "Menina e Moça" (first edition, 1554), and a number of lyrics in the style of the older poets of Portugal. Editions of his "Works" have appeared in 1645, 1785, and 1852. He died about 1550.

Ribeiro, Thomaz Antonio Fereiro, a Portuguese poet and politician; born in Parada de Gonta (Beira), July 1, 1831. He took high rank among the present-day poets of Spain by his patriotic and exquisite poem "Jaime" (1861). Among his other works may be mentioned two collections of poems: "Passing Tones" (1854), and "Even-Songs" (1858); a poetic recital "Delfino" (1868); two books of

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travel, "From Tejo to Mondovì" (1864), and "Among the Palms" (1864).

Ribera, Giuseppe. See SPAGNOLETTA.

Ribes, in botany, a genus of the order *Grossulariaceæ*. Some of the species are remarkable for their agreeable and wholesome acid fruits, and are, on this account, much cultivated in our gardens. *R. grossularia* is the source of the numerous varieties of gooseberries, so much used, both in the ripe and unripe conditions, for tarts and puddings, for making wine, and for dessert. *R. rubrum* yields both red and white currants, and *R. nigrum* black currants, or cassis. These are used for the same purposes as gooseberries, and are particularly adapted for making jams and jellies. An infusion of black currants is much used, under the name of black currant tea, as a cooling drink in fevers.

Ribot, Alexandre Félix Joseph, a French statesman; born in St. Omer, France, Feb. 7, 1842. He studied law in Paris, and in that city became prominent in legal and municipal affairs; in 1870, was secretary of the Bar Society; was appointed director of pardons and of criminal matters in 1875; after that date, occupied various chief legal, municipal, and governmental offices, becoming Minister of the Interior and president of the cabinet, in January, 1893. His government was marked by serious disturbances and in March of the same year it was overthrown. When Faure became president, in January, 1895, M. Ribot again filled the post of premier, and held the office till October of the same year, when M. Bourgeois superseded him. He was prominent in the opposition to General Boulanger, and was classed as a moderate Republican.

Ricardo, David, an English political economist; born in London, England, April 19, 1772. He stands next to Adam Smith (whose ideas he developed and systematized) in the British free-trade school of political science, and his writings have exerted a vast influence on all theories of political economy. It has been said that Adam Smith was like the first explorer of a new country, who gives a good description of its general appearance, but omits much and mistakes much; while Ricardo was the first to draw an accurate map of it. After making his fortune in the Stock Exchange in London, he retired to devote himself to the study of mathematics, chemistry, etc. The first result of his studies was a tract entitled "The High Price of Bullion a Proof of the Depreciation of Bank Notes" (1809). In 1817 appeared his most important work, "The Principles of Political Economy and Taxation." Its leading feature was the theory of rent, now universally accepted—that it represents the surplus earning power of better or more favorably situated land over that

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just good enough to be worth utilizing. Many of its other novel conceptions are now commonplaces. He published in addition a number of essays on economics. His "Works" were edited by MacCulloch (1846). His "Letters to Malthus" were published in 1887. He died in Gatcomb Park, Gloucestershire, Sept. 11, 1823.

Ricardus, Corinensis. See RICHARD OF CIRENCESTER.

Ricasoli, Baron Bettino, an Italian statesman; born in Florence, March 9, 1809; studied at Pisa and Florence; was one of the best agriculturists in Italy; wrote books on the cultivation of the vine, the olive, and the mulberry, and for 10 years worked successfully at the drainage of the Tuscan Maremma. In 1859 he took a prominent part in opposing the government of the grand-duke and when the latter fled Ricasoli was made dictator of Tuscany. He labored with great energy for the unity of Italy, and when that end was accomplished was by Victor Emmanuel appointed governor-general of Tuscany. On the death of Cavour (1861) he was called to the head of the ministry; but his government was undermined by Rattazzi, and he resigned in March, 1862. Ricasoli returned to power in June, 1866, but was again obliged to retire in April of the following year. At the same time he withdrew altogether from public life. He died in Rome, Oct. 23, 1880. Five volumes of his "Letters and Papers" were published by Tabarrini and Gotti at Florence in 1886-1889.

Ricciarelli, Daniele, better known by the name of DANIELE DA VOLTERRA, an Italian painter; born in Volterra, Italy, in 1509. He studied painting at Siena, and afterward repaired to Rome, where he was much indebted to the friendship of Michael Angelo, who not only instructed him, but gave him designs for some of his most celebrated works. His fame rests chiefly on a series of frescoes in the church of La Trinità de' Monti, Rome; and of these the "Descent from the Cross" is well known by Toschi's admirable engraving. Ricciarelli was employed by Paul IV. to partially drape the nude figures in Michael Angelo's "Last Judgment" in the Sistine Chapel of the Vatican. By this act he earned for himself the soubriquet of Il Braghettone (The Breeches-maker). In the latter part of his life Ricciarelli applied himself also to sculpture. He died in Rome, April 4, 1566.

Riccobini, Antoine François an Italian dramatic writer and actor, son of Luigi; born in Mantua, Italy. He wrote: "The Slave Comedians" (1726); "Amusements in Fashion" (1732); and an ingenious work called "Theatrical Art" (1750). He died in Paris, France, in 1772.

Riccobini, Luigi, an Italian dramatist; born in Modena, Italy, in 1675. He pub-

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lished: "History of the Italian Theater" (1728-1731); "The Comedies and Genius of Molière" (1736); "Reflections on the Theaters of Europe" (1738-1750); and several others. He died in Paris, France, in 1733.

Riccobini, Marie Jeanne Laboras de Mézières, a French actress and novelist, wife of Antoine François; born in Paris, France, in 1713. She did not succeed on the stage, and turned to the production of the sentimental novel with no little success. Her first work was the remarkable "Marquis of Cressy" (1758). This was followed by "The Letters of Julia Catesby" (1759); "Ernestine" (1770-1798), considered by many her masterpiece; "The Letters of Sophie de Vallière" (1772); etc. She died in Paris, in 1792.

Rice (*Oryza*), a genus of grasses, having panicles of one-flowered spikelets, with two very small pointed glumes, the florets compressed, the paleæ strongly nerved, awned or awnless, six stamens, one germen, and two feathery stigmas. The only important species is the common rice (*O. sativa*), one of the most useful and extensively cultivated of all grains, supplying the principal food of nearly one-third of the human race. It seems to be originally a native of the East Indies, but is now cultivated in all quarters of the globe, and almost wherever the conditions of warmth and moisture are suitable. It is adapted to tropical and subtropical climates, rather to the latter than the former; and requires much moisture, rather, however, in the soil than in the air. Rice is an annual, varying from one to six feet in height. There are many other distinguishing characters of the varieties in cultivation, some having long awns and some being awnless, some having the chaff (*paleæ*), when ripe, yellow, white, red, black, etc. The seed or grain of rice grows on little separate stalks springing from the main stalk; and the whole appearance of the plant, when the grain is ripe, may be said to be intermediate between that of barley and of oats. Rice requires a moist soil, sometimes flooded; and the cultivation has in many places been attended with an increase of intermittent fevers and of general unhealthiness, the rice fields being artificially flooded at certain seasons. In some parts of the East canals are carried along the sides of hills for the irrigation of land for the cultivation of rice. In South Carolina rice is sown in rows in the bottom of trenches, which are about 18 inches apart; the trenches are filled with water to the depth of several inches, till the seeds germinate; then the water is drawn off, and afterward the fields are again flooded for rather more than a fortnight to kill weeds. They are flooded again when the grain is near ripening. In Europe the cultivation of rice is most extensively

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carried on in the plains of Lombardy and in Valencia in Spain. Marshy situations, where there is always the same abundance of water, are not so suitable for rice as those in which the supply of water is regulated according to the season and the growth of the plant. The best of all rice known in the market for size and quality is that of South Carolina, yet the introduction of rice into the United States took place only about the middle or close of the 17th century; for the date has been disputed, 1694 being the earliest year in which it is known to have been grown.

The wild rice, plentiful in the marshy tropical countries of Southern Asia as well as in Northern Australia, is without doubt the plant from which all our forms of cultivated rice have been derived. Most modern authorities regard India as the first home of rice, though some say it was originally derived from China. It has been cultivated in India from time immemorial. At the Calcutta Exhibition of 1884, 4,000 apparently distinct forms of Bengal rice were shown, arising from differences of climate and varieties of soil. There are 1,400 different specimens of rice in the Calcutta Museum. There are as many as 1,300 names of rice, and though very many of these are merely local synonyms, a large number unquestionably correspond to intrinsic and seasonal distinctions. The obvious differences in the grain itself are indeed very remarkable. In color the specimens range from a bright golden hue through almost every gradation of tint to black; and in regard to size also they vary greatly. But all these forms of rice are referable to a very few well-marked and constant varieties of *O. sativa*, the result of seminal variation commonly observed in plants that have been long brought under cultivation. The rice exported from India is divided broadly into three qualities: (1) table rice; (2) ballam, named after the boats in which it is carried; and (3) moonchy, common or inferior rice. Cargo rice is that in which only one part in five is husked. In British India there are more than 60,000,000 acres under rice; in Ceylon, 605,000 acres; and in Cochin-China, 2,000,000 acres. It is also extensively grown in Siam, China, Japan, Java, Egypt, and Brazil. In 1890 India exported 3,450,000,000 pounds; China, 950,000,000 pounds; Japan, 400,000,000 pounds. The produce in the United States has fluctuated much. In 1860 it was 187,140,173 pounds; in 1870, 73,635,071; in 1880, 110,131,173. In 1890, 388,912 pounds were exported, and 113,308,571 pounds were imported. After South Carolina the principal rice-growing States are Georgia and Louisiana. Great Britain imports about 6,000,000 tons annually, mainly from Burma; of this half is reexported.

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In China rice is generally sown pretty thickly on very wet land, and afterward transplanted to the land which it is finally to occupy. The plants *tiller* or spread at the root very much, so that each sends up several or many stalks. The rice-grounds are carefully kept clear of weeds, though often so wet that a man cannot walk in them without sinking to the knees. In many parts of China and in other warm countries it is common to obtain two crops of rice in a year.

Rice is husked and quickly dried before being brought to market. Special milling machinery is required for removing the inner skin of the rice grain, and a large quantity of the grain is badly broken in the process, being saleable only as broken rice or rice flour. Good Indian rice has the following composition: Moisture, 13.50 per cent.; nitrogenous matter, 7.41; starch, 78.10; fatty or oily matter, 0.40; ash, 0.59. Rice contains a smaller amount of nitrogenous elements than any other grain (wheat having as much as 22 per cent.); it is also deficient in fatty matter, and if taken by itself is less nutritious than other grain food; but combined with fatty nitrogenous substances it is a valuable foodstuff. It is believed to furnish more food for man than any other grain, especially in Chinese regions; but it is not, as is commonly supposed, the chief food supply of India, where, save in certain favored areas, millet is the principal foodstuff. Ground rice is in great demand for puddings; and preparations of rice flour under such names as *rizine*, etc., are familiar. Owing to the small quantity of gluten which it contains, it is capable by itself only of an imperfect fermentation, and is unfit for being baked into bread. It is, however, subjected to fermentation, by help of added ferments of various kinds, in many countries. The beer made from rice by the Japanese is called *Saki*, and is in general use among them. Several kinds of wine are made by the Chinese and Japanese from rice, some of them highly esteemed and very intoxicating; spirit is distilled from the lees. Some of the common arrack of the East is made from rice; and rice is also largely employed by distillers in Great Britain.

Rice starch is made in considerable quantity in Great Britain, and is used in laundries and muslin manufactories. It has one-fourth more starch in its composition than wheat, hence the preference given to it by starch makers, both from its cheapness and larger yield. The straw of rice is used to make straw plait for bonnets and the straw shoes of Japan. The refuse of rice, which remains when it is cleaned for the market, and consists of the husk, broken grains, and dust, is valuable as food for cattle. It is known as rice meal and rice dust.

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Canada rice (*Zizania aquatica*), the wild rice or Indian rice of North America, is a species of grass quite different from the



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true rice, and of a different genus. It is common in North America, and particularly abundant in the N. W. parts, growing in miry places or shallow water, often on the margins of lakes. It has a culm seven or eight feet high, with broad diffuse leaves, and a large terminal panicle of male flowers, with a spike of female flowers at the summit. The flowers have six stamens. The seeds are about half an inch long, slender, farinaceous, affording very good meal, and are much used by the Indians where the plant abounds.

The production of rice in the United States in the crop year 1910 was 24,510,000 bushels, valued at \$16,624,000.

Rice Culture in the United States. Rice forms the principal food of one-half the population of the earth. It is more widely and generally used as a food material than any other cereal. Where dense populations are dependent for food upon an annual crop, and the climate permits its cultivation, rice has been selected as the staple food. The luxuriant growth of leguminous plants (beans, peas, etc.) at all seasons in tropical climate provides the nitrogenous food elements necessary to supplement rice. A combination of rice and legumes is a much cheaper complete food ration than wheat and meat and can be produced on a much smaller area. Rice is an annual plant belonging to the natural family of the grasses. There is an immense number of

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varieties of cultivated rice, differing in length of the season required for maturing, and in character, yield, and quality. Their divergence not only extends to size, shape, and color of the grain, but to the relative proportion of food constituents and the consequent flavor. South Carolina and Japan rices are rich in fats and hence are ranked high in flavor and nutrition among rice-eating nations. A botanical catalogue enumerates 161 varieties found in Ceylon alone, while in Japan, China, and India, where its cultivation has gone on for centuries, and where great care is usually taken in the improvement of the crop by the selection of the seed, no less than 1,400 varieties are said to exist. The two principal varieties of lowland rice cultivated in the Atlantic States are the "gold seed," so called from the golden-yellow color of its husk when ripe, and the "white rice," the original rice introduced into this country in 1694, which has a cream-colored husk and resembles the rice commonly grown in China. The gold-seed rice, justly famous for the quality and large yield of the grain, stands, in the estimation of the market, among the first rices in the world. Along the Atlantic coast it has practically superseded the white rice which was generally cultivated in the earlier periods of the industry. The two varieties of gold seed appear to differ little except that one has a slightly larger grain than the other. White rice is valued for its early maturity. The principal variety hitherto planted in Louisiana is the Honduras, so named from the country which furnishes the seed. The grain is similar in general appearance and character to that of the Carolina rice, but the kernel is slightly larger and the straw stiffer.

The Kiushu or Japan rice, now in process of introduction, has a short and thick kernel, and a thin hull; the percentage of bran and polish is small; the straw is still green when the grain is ripe; the yield is large.

Lowland and Upland Rice.—While rice is chiefly grown on the lands that are low, level, and easily irrigated, there are varieties which can be grown on fertile uplands without irrigation. In the interior districts of India, China, and Japan upland rice is grown to a considerable extent, and experiments have demonstrated that it can be grown over large areas in the United States; but the crop is uncertain, and, in yield and quality, considerably inferior to lowland rice produced by irrigation. Rice production in the United States is limited to the South Atlantic and Gulf States, where, in some sections, it is the principal cereal product. For nearly 190 years after the introduction of rice into the United States, South Carolina and Georgia produced the principal portion, while North Carolina, Florida, Alabama, Mississippi,

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and Louisiana grew only a limited amount. Within the last 10 years Louisiana and Texas have increased the area devoted to rice to such an extent that they now furnish nearly three-fourths of all the product of the country.

For 15 years prior to 1861 the annual production of rice in North Carolina, South Carolina, and Georgia had averaged more than 105,000,000 pounds of cleaned rice. Of this South Carolina produced more than three-fourths. But the industry in these States was wrecked by the war; and changed labor conditions, lack of necessary capital, and other causes have since prevented its full restoration. From 1866 to 1880, inclusive, the annual production of the three States averaged a little less than 41,000,000 pounds, of which South Carolina produced more than one-half. Since 1880 the average annual production has been, in round numbers, 46,000,000 pounds of cleaned rice, of which North Carolina produced 5,500,000, South Carolina 27,000,000, and Georgia 13,500,000 pounds.

Coincident with the breaking out of the Civil War began the development of the rice industry in Louisiana. For a number of years the product was small, but during the seventies the industry began to assume large proportions, averaging nearly 30,000,000 pounds for the decade and exceeding 51,000,000 in 1880. In 1885 the production of Louisiana reached 100,000,000 pounds, and in 1892 182,000,000 pounds; but these were years of exceptionally large crops. The average crop of the State since 1880 has been in round numbers, 86,000,000 pounds of cleaned rice.

The great development of the rice industry in Louisiana since 1884 has resulted from the opening up of a prairie region in the S. W. part of the State, and the development of a system of irrigation and culture which made possible the use of harvesting machinery similar to that used in the wheat fields of the Northwest, thereby greatly lessening the cost of production. In 1896, however, a new difficulty began to be felt. The varieties of rice which yielded best and were otherwise most satisfactory from a cultural standpoint under the new system proved inferior commercially because the percentage of grains broken in the process of milling was very large, and the proportion of "head rice," made up of the unbroken grains, was low. As the Japanese rices possess superior milling qualities, yielding a high percentage of head rice, it was desirable that they should be experimented with in this country. With the idea in view, the Department of Agriculture in the spring of 1899 imported from Japan about 10 tons of Kiushu rice, which was distributed to experimenters in Southwestern Louisiana, and elsewhere in the rice belt.

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In rice culture the size of the fields depends on circumstances, chief among which are the slope of the land and the character of the soil as regards drainage. Fields range in size from 60 to 80 acres on the level prairies of Southwestern Louisiana down to 1 or 2 acres along the banks of the Mississippi river. In Oriental countries fields seldom contain more than a half acre. The entire surface of each field should be nearly at the same level so that the irrigation water will stand at about the same depth. Hence, where the slope of the surface is considerable, the fields must be made small. Fields must also be laid off in such a manner as to admit of effective drainage.

In coast-marsh and river-bottom culture a canal is excavated on the outer rim of the tract selected completely inclosing it. The excavated dirt is thrown upon the outer bank to form a levee. The canal must be of sufficient capacity for irrigation and drainage. The levee must be sufficient not only to inclose the flooding water, but to protect the fields from encroachment of the river at all seasons. When practicable the rice lands are flooded from the river, and find drainage by a canal or subsidiary stream that enters the river at a lower level. The embankment must be sufficient to protect the rice against either freshets or salt water. Freshets are injurious to growing rice, not only because of the volume of water, but by reason of the temperature. A great body of water descending rapidly from the mountains to the sea is several degrees colder than water under the ordinary flow. Any large amount of this cold water admitted to the field not only retards the growth but is a positive injury to the crop. In periods of continued drought the salt water of the sea frequently ascends the river a considerable distance. Slightly brackish water is not injurious to rice, but salt water is destructive.

The tract of land selected and inclosed is then cut up by smaller canals into fields or subfields of suitable size, a small levee being thrown up on the borders of each. The entire tract is usually level, but if there should be any inequality care must be taken that the surface of each subfield be level. The main canal is from 10 to 30 feet wide, about 4 feet deep, and connects with the river by flood gates. Through these, canal boats of considerable tonnage have ready access to the entire circuit of the tract, while smaller boats can pass along the subcanals to the several fields. The subcanals are usually from 6 to 10 feet in width and should be nearly as deep as the main canal. During the flooding period the ditches and canals become more or less filled with mud which flows into them with the water. As soon after harvest as possible the ditch banks should be

Rice

cleared of foul grasses, weeds, or brush, and the ditches cleaned. The levees should be examined to see if they are in repair. The entirely different method employed in the prairie regions of Southwestern Louisiana and adjacent Texas will be described further on. The time of plowing differs with different lands and circumstances, but in general it may be said that for wet culture plowing is done in the spring shortly before planting time. In the South Atlantic States, however, the land is often plowed or dug over with a hoe early in the winter. In some parts of Southern Louisiana the land is so low and wet and the soil so stiff as to necessitate plowing in the water.

Some planters advocate shallow plowing for rice, because it appears to thrive best in compact earth. Even if this be granted, it does not prove the superiority of shallow over deep plowing. It has been demonstrated that the better the soil and the more thoroughly it is pulverized the better the crop. The roots of annual cultivated plants do not feed much below the plow line, so that it becomes evident that deep cultivation places more food within the reach of the plant. If pulverizing the earth deeply be a disadvantage by reason of the too great porosity of the soil at seeding time, it can be easily remedied by the use of a heavy roller subsequently. If the soil is well drained deep plowing will be found profitable. Deep plowing just before planting sometimes brings too much alkali to the surface. The remedy for this is to plow a little deeper than the previous plowing just after harvest. The alkali will then be washed out before the spring plowing. The plow should be followed in a short time by the disk harrow and then by the smoothing harrow. If the land is allowed to remain in the furrow for any considerable time it will bake and can not be brought into that fine tilth so necessary to the best seed conditions. This is particularly true of rice land. If the best results are desired it will be advisable to follow the harrow with a heavy roller. The roller will crush the lumps, make the soil more compact, and conserve the moisture for germinating the grain, rendering it unnecessary to flood for "sprouting." For dry culture the land is prepared very much as it is for a crop of oats. Perfect drainage is one of the most important considerations in rice farming, because upon it depends the proper condition of the soil for planting. It may appear unimportant that a water plant like rice should have aerated and finely pulverized soil for the seed bed, but such is the case. Thorough cultivation seems to be as beneficial to rice as to wheat. Complete and rapid drainage at harvest always insures the saving of the crop under the best conditions and reduces the expense of the harvest. Thorough drainage

is even more essential for rice than for wheat, because irrigation brings the alkali to the surface to an extent that finally becomes detrimental to the rice plant. Alkali sometimes accumulates in the soil just below the depth of the usual furrow to such an extent that any plowing is dangerous to the crop. Experience has shown that there is but one effective way of disposing of these salts, and that is by thorough drainage and deep plowing. As the water drains away the excess of soluble salts is carried off. Now if the ditches are no deeper than the ordinary furrow it is evident that only the surface of the soil can be cleared. Either tiling must be employed or there must be plenty of open ditches, the main ones at least three feet deep.

Too great care cannot be exercised in selecting rice for seed. It is indispensable that the seed should be free from red rice, grass, and weed seeds, uniform in quality and size of kernel, well filled, flinty, and free from sun cracks. Uniformity of kernel is more essential in rice than in other cereals, because of the polishing process. The best time to sow rice differs in different sections and varies somewhat with varying conditions in the same section. It may be sown between the middle of March and the middle of May, but in most cases it should be sown by April 20 for best results. Sowing should take place as soon as possible after spring plowing. Care must be taken to plant the several fields at different periods, so that harvest will not be too crowded. The amount of rice sown per acre varies, in different sections and with different methods of sowing, from one to three bushels per acre.

Three different methods of treating the seed are followed. Some let on just enough water to saturate the ground immediately after sowing and harrowing and at once draw off any surplus water. This insures the germination of the seed. Others sow and trust to there being sufficient moisture in the land to germinate the seed. This is sometimes uncertain and rarely produces the best results. A few sprout the seed before planting by placing bags of rice in water. This is sure to be a failure if the soil is very dry when the seed is sown. In case of planting in dry soil without following with water saturation, rolling the land after seeding and harrowing has been found beneficial.

The rice should be planted with a drill. It will be more equally distributed and the quantity used to the acre will be exact. The seeds will be planted at a uniform depth and the earth packed over them by the drill roller. It also prevents the birds from taking the seeds. The roller should precede the drill. If it follows the drill the feet of the horses, mules, or oxen drawing the roller will press some of the planted

rice four or five inches deeper into the earth than the general average. Furthermore, the lumps of earth will prevent the uniform operation of the drill. In rice farming too much emphasis cannot be placed on the importance of thoroughly pulverizing the soil to a considerable depth, leveling with a harrow as perfectly as possible, crushing all the lumps and packing the surface to conserve the moisture, and planting the seed at a uniform depth.

Broadcast Sowing.—Broadcast sowing of rice is the method most in vogue in many localities, but it should be discontinued; the seed is never scattered with uniformity; some grains remain on the surface and the remainder is buried by the harrow and the tramp of the team to depths varying from one to six inches. Rice sown broadcast does not germinate with any uniformity. Some seeds are taken by the birds, some are too near the surface and lack moisture to germinate, while others are buried too deep. In some instances the variation in the germination of the rice in the same field has been as much as eight weeks. Then at the harvest when the main portion is ready for the reaper, quite an amount of the rice is still immature. The product commands a very low price in the market, because the merchantable grain must sell at the price of the low grade. It requires much more care to produce a strictly first-class quality of rice than is found necessary in the production of any other cereal, and nearly every fall prime offerings are the exception.

Flooding is the most important distinctive feature of rice culture as compared with the culture of cereals generally. When it is considered that rice can be grown successfully without any irrigation whatever or with continuous irrigation from the time of sowing till nearly ripe, the wide scope there is for variation in practice will be realized. Except where water is necessary for germinating the seed, flooding is not practised till the rice is from six to eight inches high. If showers are abundant enough to keep the soil moist it is better to delay flooding till the rice is eight inches high, as there is considerable danger of scalding the rice when very young. At eight inches high a sufficient depth of water can be allowed on the field to prevent scalding. The depth of water that should be maintained from the first flooding until it is withdrawn for the harvest depends on other conditions. If the growing crop thoroughly shades the land, just water enough to keep the soil saturated will answer. To be safe, however, for all portions of the field, it should stand from three to six inches deep, and, to avoid stagnation, it should be renewed by a continuous inflow and outflow. In case the stand of rice is thin the water should be deeper. A flow of water through the field

aids in keeping the body of the water cool and in preventing the growth of injurious plants that thrive in the stagnant water. The water should stand at uniform depth all over the field. Unequal depths of water will cause the crop to ripen at different times.

In South Carolina under the usual method the water is let on as soon as the seed is covered, and remains on four to six days, till the grain is well sprouted. It is then withdrawn. As soon as the blade is up a few inches the water is sometimes put on for a few days and again withdrawn. The first water is locally called the "sprout water." After the rice has two leaves the so-called "stretch water," or "long-point flow," is put on. At first it is allowed to be deep enough to cover the rice completely—generally from 10 to 12 inches—then it is gradually drawn down to about six inches, where it is held from 20 to 30 days. It is then withdrawn and the field allowed to dry. When the field is sufficiently dry the rice is hoed thoroughly, all grass and "volunteer" rice being carefully removed. After hoeing it remains without irrigation till jointing commences, when it is slightly hoed, care being used to prevent injury to the plants, and the water is then turned on again. During the time water is held on the rice it is changed at least every week to avoid becoming stagnant. When this occurs rice is liable to be troubled with the water weevil. This "lay-by flow," or final irrigation, continues till about eight days before the harvest, when the water is drawn off for the field to dry.

Fertilizing.—Rice is not a great impoverisher of the soil, especially if the straw and chaff are regularly returned to it. It has been claimed that the flooding of the rice fields restores to the soil as much nutritive material as the rice crop removes. Where lands are flooded from rivers like the Mississippi or the Nile, which carry a large amount of silt, this may be true. It is not the case where flooding is done with pure water. The continued fertility of the rice field can only be maintained by restoring to the soil annually a portion of what the crop removes. Whether this can be more economically done by the use of commercial fertilizers and plowing under the rice straw, or by fallowing occasionally and using some renovating crop as a green manure is an economic question to be determined by each planter according to the conditions presented. Repeated trials of commercial fertilizers have almost invariably shown gains in the quality and quantity of the crop more than sufficient to cover the cost. Summer fallowing, where it can be practised, is, in addition to its renovating effect, a substantial aid in destroying noxious grasses and red rice. There is very little exact information on the sub-

ject of fertilizers for rice. In Japan and other Oriental countries a large proportion of the rice lands is thoroughly fertilized in the fall with straw, leaves, rice hulls, fish, and night soil. The fields are planted to wheat, or vetches for the winter crop, followed the next spring by rice without additional manure.

Harvesting.—Reaping machines are generally used in the prairie district of Louisiana and Texas. Where the use of reaping machines is impracticable, the sickle is the implement commonly used in harvesting rice. The rice is cut at from 6 to 12 inches from the ground, and the cut grain is laid on the stubble to keep it off the wet soil and to allow the air to circulate about it. After a day's curing the grain is removed from the field, care being taken not to bind it while wet with dew or rain. The smaller the bundles the better will be the cure. Care in shocking is also important. Thirty per cent. of the crop may be lost by improper shocking. The following directions will aid: (1) Shock on dry ground; (2) brace the bundles carefully against each other so as to resist wind or storm; (3) let the shock be longest E. and W., and cap carefully with bundles, allowing the heads of the capping bundles to fall on the N. side of the shock to avoid the sun. Exposure of the heads to sun and storm is a large factor in producing sun-cracked and chalky kernels, which reduce the milling value. Slow curing in the shade produces the toughness of kernel necessary to withstand the milling process. In the shock every head should be shaded and sheltered from storm as much as possible. The rice should be left in the shock till the straw is cured and the kernel hard. Whether stacking rice from the shock is a benefit depends on the condition of the grain and straw at the time of stacking and how the stacking is done. If too much heat is generated, stacking is an injury. It is, moreover, of less importance with rice than with wheat. Judging from the practice in other countries, rice well cured in the shock and aired after threshing ought to keep in the bin without heating. The primitive methods of "flailing," "treading out," etc., have largely given place to the use of the steam thresher. At the commencement of the threshing examination should be made to see that there is no avoidable breakage of the grain. If the rice is damp when delivered from the machine, it should be spread on a floor and dried before sacking, so as to be in the best condition for the market, for color of grain affects the value.

Yield of Rice.—The yield of rice varies with conditions of soil and climate and methods of culture. The commercial standard weight of "rough rice" is 45 pounds to the bushel. The product is usually put up in sacks or barrels of 162 pounds each.

In South Carolina and Georgia the average yield is given as from 8 to 12 barrels. Good lands properly managed will give a considerably larger yield. The yield in South-western Louisiana is said by good authority to range from 8 to 18 barrels per acre. In a report made by planters to the Savannah Rice Association, Jan. 28, 1882, the average yield to the acre is placed at 30 bushels and the cost of production is fixed including the interest on the land, at \$35 per acre. In a report made by prominent rice planters to the House Committee on Ways and Means in January, 1897, the average yield to the acre is placed at 32 bushels, and the cost of production is fixed at \$24. If we take the latter estimate, the cost to the planter in the Atlantic States of raising 100 pounds of rough rice is \$1.66, or \$2.69 per sack of 162 pounds. Of course this is only an average, the cost being much less in some instances and in others much greater.

The rice as it comes from the thresher is known as "paddy" or "rough rice." It consists of the grain proper with its close-fitting cuticle roughly inclosed by the somewhat, stiff, hard husk. The object of milling is to produce cleaned rice by removing the husk and cuticle and polishing the surface of the grain. The hulls or chaff constitute about 20 per cent. of the weight of the paddy. The improved processes of milling rice are quite complicated. The paddy is first screened to remove trash and foreign particles. The hulls, or chaff, are removed by rapidly revolving "milling stones" set about two-thirds of the length of a rice grain apart. The product goes over horizontal screens and blowers, which separate the light chaff and the whole and broken kernels. The grain is now of a mixed yellow and white color. To remove the outer skin the grain is put in huge mortars holding from four to six bushels each and pounded with pestles weighing from 350 to 400 pounds. Strange to say, the heavy weight of the pestles breaks very little grain. When sufficiently decorticated, the contents of the mortars, consisting now of flour, fine chaff, and clean rice of a dull, filmy, creamy color, are removed to the flour screens, where the flour is sifted out; and thence to the fine-chaff fan, where the fine chaff is blown out. On account of the heat generated by the heavy frictional process through which it just has passed, the rice next goes to the cooling bins. It remains here for eight or nine hours, and then passes to the brush screens, whence the smallest rice and what little flour is left pass down on one side and the larger rice down the other. The grain is now clean and ready for the last process — polishing. This is necessary to give the rice its pearly luster, and it makes all the difference imaginable in its appearance.

The polishing is effected by friction against the rice of pieces of moose hide or sheepskin, tanned and worked to a wonderful degree of softness, loosely tacked around a revolving double cylinder of wood and wire gauze. From the polishers the rice goes to the separating screens, composed of different sizes of gauze, where it is divided into its appropriate grades. It is then barreled and is ready for market.

In mills more recently erected the foregoing process has been modified by substituting the "huller" for the mortar and pounder. The huller is a short, cast iron, horizontal tube with interior ribs and a funnel at one end to admit the rice. Within this tube revolves a shaft with ribs. These ribs are so adjusted that the revolution of the shaft creates the friction necessary to remove the cuticle. The rice passes out of the huller at the end opposite the funnel. It resembles externally a large sausage machine. It requires six hullers for each set of burs. The automatic sacker and weigher is used instead of barreling, sacks being preferred for shipping the cleaned rice. With the above modification of the milling processes considerable reduction has been made in the cost of the mill. Mills of a daily capacity of 60,000 pounds of cleaned rice can now be constructed at a total cost of from \$10,000 to \$15,000.

In 1884 and 1885 a few farmers from the Northwestern prairie States settled on the great Southern prairie which extends along the coast from the parish of St. Mary in Louisiana to the Texas line — about 140 miles. Finding that rice, which had been grown for many years for home consumption, but by Oriental methods, was well suited to the conditions of agriculture here, they commenced immediately to adapt the agricultural machinery to which they had been accustomed to the rice industry. The gang plow, disk harrow, drill, and broadcast seeder were readily adjusted, but the twine binder encountered a number of serious obstacles. However, by the close of 1886 the principal difficulties had been overcome. Wherever prairies were found sufficiently level, with an intersecting creek which could be used to flood them, they were surrounded by a small levee thrown up by a road grader or by a plow with a strong wing attached to the moldboard extending it four or five feet. These levees were usually from 12 to 24 inches high, and the interior ditch was from 12 to 18 inches deep and from 4 to 5 feet wide. Very few interior ditches were made for drainage. The land was so level that fields of 40 or 80 acres were common. Large crops were produced. The prairies were practically free from injurious grasses, and the creek or river water was soft and bore no damaging seeds to the fields. The rice fields were handled like the bonanza wheat farms of Dako-

ta and fortunes were made. Levees were cheaply constructed; little attention was paid to drainage, more than to remove the surface water; shocking, stacking, and threshing were done in a very careless manner; the main object being apparently to plant a large acreage and secure a certain number of bushels, regardless of quality. Ultimate failure was certain but it was hastened by drought. A succession of dry years followed. The creeks failed, and reservoirs were found to be expensive and unreliable.

The soil and climatic conditions in Southeastern Texas are almost precisely like those in Southwestern Louisiana. Rice culture in this section requires no separate treatment. What is applicable to the one applies also to the other. There is a belt of prairie well suited to rice extending from the Sabine river W. for 100 miles or more along the coast. Within a few years large farms have been opened and devoted to this cereal with excellent returns. To provide a reliable supply of water, pumping plants for raising water from the streams were gradually put in. The elevation of the prairies above the streams varies from 6 to 38 feet, the larger portion being from 15 to 25 feet. At first farms along the streams and lakes were irrigated; gradually large surface canals were constructed.

Irrigating canals were started in a small way in Acadia parish, La., in 1890. In 1894 a canal 40 feet wide was built for 15 miles with 10 miles of laterals. This was followed by the Crowley canal, which is now 35 feet wide and 8 miles in length, and has 10 miles of lateral lines. The Riverside canal was the next, and now has several miles in operation. These enterprises have grown steadily till there are now nine canals in Acadia parish, with an approximate length of 115 miles. There are about 25 irrigating canals in Acadia, Calcasieu, Cameron, and Vermilion parishes, with a total length of over 400 miles of mains and probably twice that extent of laterals, built at a total cost of about \$1,500,000. In nearly every township there are one or more ridges slightly above the surrounding land. On these surface canals are built from 20 to 150 feet in width, according to the area to be watered. The sides of the canal are raised from four to five feet with plows and scrapers or with grading machinery. Grading machines work very well, as the soil is a loam or a clay loam free from stones. Side gates are inserted in the embankment as frequently as necessary. Laterals are run from the main canal to accommodate remote farms. Powerful pumping plants are erected on the bank of the river at the head of the surface canal. These canals, where well constructed and operated, prove entirely successful

and make the rice crop a practical certainty over a large section of country. They range in irrigating capacity from 1,000 to 30,000 acres. The usual water rent charged the planter by the canal company is 324 pounds of rough rice per acre watered.

Scarcely had the surface canals been accepted as a success when Southwestern Louisiana was startled by the announcement that there were strata of gravel at 125 to 200 feet under the surface of the entire section, containing an unlimited supply of water, which would, of its own pressure, come so near the surface that it could be readily pumped. This was received with considerable incredulity at first, but repeated tests have proved that there is a bed of gravel nearly 50 feet in thickness underlying this section of Louisiana, which carries a large amount of soft water with sufficient pressure to bring it nearly to the surface. Pipes of 2, 3, 4, 6, and 8-inch size have been sunk to the gravel and pumped continuously for months without diminution of the supply. The water is soft, at a constant temperature of about 70° F., and absolutely free from injurious seeds or minerals. Such is the facility with which these wells are made that a 6-inch tube has been put down to the full depth required—200 feet—in 14 hours. Thus far it has been found that a 2-inch pipe will furnish sufficient water to flood 10 acres of rice and a 6-inch pipe will flood from 80 to 90 acres. Any number of wells may be made, and even if no more than 20 or 30 feet apart one does not diminish the amount of water obtained from another. It is probable that such wells will become common for the irrigation of other crops than rice.

A 6-inch well will furnish a constant stream for a four to five-inch pump. A system of such wells may be put down from 30 to 40 feet apart and each one will act independently and furnish as much water as if it stood alone. Such a combination of wells may be united just below water level and all be run by one engine and pump. Water rises naturally in these wells to within 20 feet of the surface, and a number of flowing wells have been secured. The lift is not greater than from rivers, lakes, or bayous into canals. Eight 4-inch wells united at the top can be run by one 16-inch pump and a 50-horsepower engine, and will flood 1,000 acres of rice. The total cost of an irrigating plant sufficient for flooding 200 acres is from \$1,500 to \$2,500. It requires about 70 days' pumping for the rice season.

The operations of harvesting and threshing the rice crop in Southwestern Louisiana are performed largely with the McCormick self-binder and the steam thresher. The use of the former is favored by the size of the fields and by the char-

acter of the soil. The use of the latter is a cheap, rapid, and effective method of separating the rice from the straw. Without the use of such machines the large cultural operations would be impossible.

The outlook for the further extension of the industry is very promising. According to the best estimates there are about 10,000,000 acres of land in the five States bordering the Gulf of Mexico well suited to rice cultivation. The amount which can be successfully irrigated by present methods, using the available surface and artesian flows, does not exceed 3,000,000 acres. The balance of the land could probably be brought into cultivation were it necessary, but the cost would perhaps be prohibitive at present prices. Three million acres is a conservative estimate of the amount which can be successfully irrigated. The best results require rotation of crops; consequently only one-half of that amount, or 1,500,000 acres, would be in rice at one time. At an average yield of 10 barrels (of 162 pounds) per acre, 1,500,000 acres of rice would produce nearly 2,500,000,000 pounds of cleaned rice, nearly six times the amount of our present consumption. There is no satisfactory reason why the United States should not grow and mill all of its own rice and become an exporter. The employment of machinery in the rice fields of the Southwest similar to that used in the great wheat fields of California and the Dakotas is revolutionizing the methods of cultivation and greatly reducing the cost. The American rice grower, employing higher priced labor than any other rice grower of the world, will ultimately be able to market his crop at the least cost and the greatest profit. If, in addition, the same relative improvement can be secured in the rice itself, if varieties which yield from 80 to 90 per cent. of head rice in the finished product can be successfully introduced, American rice growers will be able to command the highest prices for their product in the markets of the world. In view of the success in this direction of the Kiushu rice experimentally introduced by the Department of Agriculture, more than 100 tons of this rice were ordered from Japan by Louisiana planters for the season of 1900.

S. A. KNAPP.

Rice, Edmund, an American military officer; born in Cambridge, Mass., in 1842; entered the Union army at the beginning of the Civil War; appointed captain in 1861; and was mustered out of service as colonel in 1865. He received a medal of honor for conspicuous bravery in the battle of Gettysburg. In 1866 he entered the regular army, rose to colonel, and was assigned to the 5th Infantry in 1870. He organized and commanded the Columbian Guards at the World's Columbian Exposition; was military attache at Tokyo, Japan; appoint-

ed Inspector-General, U. S. A., in 1898; and later was colonel of the 26th Volunteer Infantry. He invented a trowel bayonet, stacking swivel and knife-intrenching bayonet. He died July 20, 1906.

Rice, James, an American educator; born in Richmond, Ky., Nov. 25, 1842; was graduated at Georgetown College, Ky., in 1866, president of Concord College in 1868-1872 and 1876-1880; of Lebanon Female College in 1872-1876; of Masonic College in 1880-1888; and of the Southwest Baptist College after 1897. He was active in the Baptist ministry in 1888-1897.

Rice, James, an English novelist; born in Northampton, England, Sept. 26, 1843. His reputation was well assured by the publication of "Ready-Money Mortiboy" (1872), the first of the series of clever novels which he issued in conjunction with Walter Besant. It was subsequently dramatized under the title of "Ready Money." This remarkable partnership continued with "The Golden Butterfly" (1876), "The Chaplain of the Fleet" (1879), "The Seamy Side" (1881), and several others. Previous to the partnership he had published "History of the British Turf" (1879). He died in London, April 25, 1882.

Rice, Willard Martin, an American clergyman; born in Lowville, N. Y., April 30, 1817; was graduated at Wesleyan University in 1837; and was tutor there till 1840, when he established a classical school in Philadelphia. He was ordained in the Presbyterian Church in 1858, and held charges in Philadelphia till 1884. He became a member of the Presbyterian Board of Publication in 1862; and after 1876 was engaged on the various publications of the Board. He was the author of "History of the Presbyterian Board of Publication and Sabbath-School Work"; "Westminster Lesson-Leaf, from Years 1878-1896, Inclusive," "Westminster Question-Book, from Years 1875-1896"; etc. He died in 1904.

Rice, Wallace (de Groot Cecil), an American literary critic; born in Hamilton, Canada, Nov. 10, 1859; was educated at Harvard University, and admitted to the Chicago bar in November, 1884. He served as reporter and critic on various Chicago papers, among them the "Herald," the "Tribune" and the "Chap-Book." He has lectured extensively on contemporaneous verse; is the author of "Under the Stars and Other Songs of the Sea," "Heroic Deeds," "Flying Sands," "Wild Animals," etc., and edited several works in verse, notably, the poems of Rudyard Kipling, of Francis Brookes, and Johannes Secundus.

Rice, William Morton Jackson, an American painter; born in Brooklyn, N. Y., Feb. 18, 1854; was graduated at Cornell University in 1874; studied painting in Paris under Carolus Duran in 1881-1884;

Rice

and became a member of the Society of American Artists and an associate of the National Academy of Design.

Rice, William North, an American educator; born in Marblehead, Mass., Nov. 21, 1845; was graduated at the Wesleyan University in 1865; was Professor of Geology and Natural History at the Wesleyan University in 1867-1884; and of Geology after 1884; and was assistant geologist of the United States Geological Survey in 1891-1892. He was president of the American Society of Naturalists in 1891; author of "Geology of Bermuda" (1884); "Science Teaching in the Schools" (1889); "Twenty-five Years of Scientific Progress and Other Essays" (1894); etc.; and editor of Dana's "Text-book of Geology" (1897).

Rice Bunting, a name given to two distinct birds. The first, also known by the name "bob-o-link," is the *Emberiza oryzivora* (or *Dolichonyx oryzivorus*), a bird of the bunting family, which migrates over North America from Labrador to Mexico, appearing in Massachusetts about the beginning of May. Their food is insects, worms, and seeds, including rice in South Carolina. The song of the male is singular and pleasant. When fat their flesh becomes little inferior in flavor to that of the European ortolan. The other species, known as the rice bunting, is the *Oryzornis oryzivora*, also known as the Java sparrow and paddy bird. It belongs to the true finches, a group nearly allied to the buntings. It possesses a largely-developed bill; the head and tail are black, the belly rosy, the cheeks of the male white, and the legs flesh-colored. It is dreaded in Southern Asia on account of the ravages it commits in the rice fields. It is frequently brought to Europe, and is found in aviaries.

Rice Paper, the produce of the *Aralia papyrifera*, a low shrub, with large leaves, from Formosa, where it is wild and abundant. The trunk and branches resemble those of the elder. The pith, dried and rolled, or hammered, and pared by sharp knives, forms the paper. It is dyed of different colors, and large sheets are obtained by pressing the smaller pieces together. It is usually sold in small squares of about four inches, made up into packets of 100 each.

Rich, Edmund, an English ecclesiastic; born in Abingdon, England, about 1195. He studied theology at Paris, afterward taught the Aristotelian logic and scholastic philosophy in Oxford, and was prebendary and treasurer of Salisbury Cathedral 1219-1222. He preached the sixth crusade in 1227, became Archbishop of Canterbury in 1233, and exhibited great energy as a reformer. His authority was superseded by that of the legate, Cardinal Otho, and being unable to obtain redress at Rome he retired to France

Richard I.

in 1240 and died in 1242. He was canonized in 1249.

Richard I., King of England, surnamed CŒUR DE LION; third son of King Henry II. and his wife, Eleanor of Aquitaine; born either at Oxford or at Woodstock, Sept. 8, 1157, but was brought up among the knights and troubadours of Poitou, in Aquitaine, with which duchy, his mother's patrimony, he was while still a child invested by his father. In England Richard did not spend in all his life a full year; after he became king he spent only 26 weeks in his kingdom, 17 weeks when he landed to take the crown and to go through the coronation ceremony at Westminster, and nine weeks when he came back from his imprisonment. It may indeed reasonably be doubted whether he could speak English. A favorite of his unprincipled mother, he was induced by her to join his brothers Henry and Geoffrey in their rebellion (1173) against their father (see HENRY II.). Henry II. had his eldest son, Prince Henry, crowned king as his successor during his own lifetime; and in 1183 he ordered that his younger brothers should do homage to him. Richard obeyed with the greatest reluctance; thereupon the ungrateful Prince Henry at once picked a quarrel with him, and marched an army into his duchy of Aquitaine. King Henry hastened to the assistance of the young duke, while the other brother, Geoffrey, sided with the prince. But the sudden sickness and death of the ingrate put an end to the quarrel. In the spring of 1189 Richard was in his turn in arms against his father. Philip of France, the pertinacious foeman of King Henry, mingled in the strife; and eventually Richard joined forces with his father's enemy, did homage to him, and took the field against the old king. A reconciliation was rendered more difficult because of Richard's jealousy of John, his father's favorite.



KING RICHARD I.

Richard became King of England, Duke of Normandy, and Count of Anjou on July 5, 1189, and was crowned King of England on Sept. 3, following. But he had already taken the vows of the crusader; and besides his coronation, he had another object in coming to England; he wanted to raise funds for his crusade. He effected this latter purpose in a brief space of time by selling whatever he could get a purchaser for. About midsummer 1190 he met Philip of France at the rendezvous, Vezelai in France; but from Lyons he made his way by a different route from Philip to Messina in Sicily. Both kings spent the winter at that city, and their mutual jealousy came within a hair's-breadth of a rupture. The throne of Sicily had just been seized by the Norman Tancred, an illegitimate son of King Roger, though the lawful heir was Henry of Hohenstaufen, son of Frederick Barbarossa, and afterward the Emperor Henry VI. Moreover, Tancred detained in custody Johanna, widow of the late king (William the Good) and sister of Richard I., together with her very large dowry. But he made his peace with Richard by giving up to him his sister and her possessions, and by betrothing his little daughter to the boy Arthur (son of Richard's dead brother Geoffrey), whom Richard now declared to be his heir.

On his way to Palestine in the spring of 1191, part of the fleet of the English king was driven on to the island of Cyprus, and the crews were most inhospitably treated by the reigning sovereign, Isaac Comnenus, a nephew of the Emperor of Byzantium, who had revolted from his liege lord. Richard sailed back from Rhodes, routed Isaac in battle, deposed him, and gave his crown to Guy of Lusignan. In Cyprus, too, he married Berengaria of Navarre, whom his mother had brought to him at Messina. At last, on June 8, the English king landed near Acre, and shortly afterward that stronghold surrendered, the siege having lasted two years. Richard took his full share of the jealousies, animosities, and disagreements, though not of the treacheries, that made the Christian crusading host a hotbed of commotion. The glorious exploits of Richard the Lion-hearted—his march to Joppa along the seashore, his approach on Jerusalem at Christmas, his capture of the fortresses in the S. of Palestine, his second advance in the summer of 1192 on Jerusalem (the city he never beheld), and his relief of Joppa—made his name ring throughout the East and excited the wonder and admiration of Christendom, but brought no real advantage to the crusading cause.

Richard in September concluded a peace with Saladin for three years, three months,

and three days, and in his impulsive, impatient way started off home alone, without waiting for his army and fleet. A storm shipwrecked him near the N. end of the Adriatic. In disguise he began to make his way through the dominions of his bitter enemy, the Archduke of Austria. He was recognized, seized, and handed over to the Emperor Henry VI. (March, 1193). The emperor demanded a heavy ransom for his release, but promised to give him the kingdom of Arles in addition to his liberty. Richard's loyal subjects raised the money; and greatly to the chagrin of Philip of France and Richard's brother John, the captive king returned home (March 13, 1194).

In England in the meantime Longchamp had made himself so unpopular that Richard had been obliged to supersede him, appointing in his place Walter of Coutances, Archbishop of Rouen. It was John, however, who exercised the greatest power in the realm. And though he used his utmost endeavors to prevent Richard's return from his captivity, yet Richard generously forgave him. After distributing judicious rewards and punishments, raising what money he could, making arrangements for the governance of the kingdom, and being crowned again—the emperor is said to have forced his captive to resign his crown and take it back as a fief of the empire—Richard proceeded to France, and spent the rest of his life there, warring against Philip. England was governed in his absence by Hubert Walter, Archbishop of Canterbury, who by the measures he took to raise the vast sums demanded by his master trained the English people in habits of self-government. The most important constitutional advances made under Hubert's rule were the formulation of the methods for electing the county grand juries and an arrangement for keeping the pleas of the crown by officers who may be regarded as the forerunners of the modern coroner. Richard was shot, on April 7, 1199, by an archer of the Viscount of Limoges, while besieging that nobleman's castle of Chalus-Chabrol, and was buried in the abbey church of Fontevraud.

Richard cannot be called a good king; his only thought of his subjects was how to get money from them. He was not a faithful husband; he was an undutiful son. Yet, on the other hand, he treated his perfidious brother John in the most forgiving spirit, and was not incapable of noble and generous acts. His impulsive, hot-headed temperament made him at times cruel, but never vindictive. He was an adventurer, with a passionate love for contention and strife; he fought for warlike glory, not for victory or real advantage; he had all the personal courage and self-confidence of the born warrior; and a very large share of that care-

less indifference or magnanimity that is frequently associated with a bold and self-reliant character. In matters of dress and ceremony he loved magnificence, and was both ostentatious and extravagant. In person he was tall and ruddy, very skillful in the use of his weapons, and possessed of great personal strength. A fair scholar, he also had the knack of writing verses, and has been called a poet.

Richard II., King of England; son of the Black Prince and Joanna of Kent; born in Bordeaux, Jan. 6, 1367; was acknowl-



KING RICHARD II.

edged by Parliament heir to the crown on the death of his father in 1376, and succeeded his grandfather, Edward III., on June 21, 1377. The government was entrusted to a council of 12, from which the king's uncles, John of Gaunt, Duke of Lancaster, Edmund, Earl of Cambridge, and Thomas, Earl of Buckingham (afterward Duke of Gloucester), were excluded. Nevertheless the central figure during the early years of this reign, as he had been during the last years of the preceding reign, was John of Gaunt, whose overreaching ambition and inability were a fruitful source of disquietude. He was on bad terms with the clergy and with the Londoners, and was viewed with great suspicion by the king and the commons; yet he was the most powerful man in the kingdom, having at his back the nobles and to some extent the Lollards: War was going on with France, but in a very weak and desultory fashion; the French ravaged the S. coast at the time of Edward III.'s death, and truces were constantly being made for short durations. But this war cost money; so too did the extravagance of the court; and more was absorbed or wasted by the government, for which John of Gaunt was held by the nation at large to be mainly responsible. Consequently taxation was heavy.

The imposition of a graduated poll-tax in 1380 provoked popular risings, directed principally against the gentry and landholders, in nearly all parts of the kingdom, at Whitsuntide in the following year. The insurgents destroyed the parks, attacked the manor houses, burned the court-rolls, and massacred the lawyers who had charge of them. The men of Essex and Kent, to the number of 100,000, marched on London. The former body, whom the king met at Mile End on June 14, consented to return home when the young monarch assured them he would grant their requests, and take measures to liberate the villeins from bondage and to commute their personal services into fixed money rents. The men of Kent, after destroying the Savoy (the Duke of Lancaster's palace), burning Temple Bar, opening the prisons, and breaking into the Tower and slaying the Archbishop of Canterbury, met the king at Smithfield (15th). During the negotiations, William Walworth, the mayor of London, struck down Wat Tyler, the leader of the insurgents. The king immediately rode among them, exclaiming he would be their leader, and granted them the concessions they asked. The risings in the other counties speedily collapsed when the people learned what the king had done; but during the autumn severe punishment overtook them. Seven thousand in all are said to have perished in the fighting and on the scaffold.

The causes of this wide-spread and simultaneous uprising on the part of the mass of the rural population may be summarized as follows: There had been long continuance of heavy taxation; the villeins resented the reimposition since the black death of personal services, and were anxious to become tenants of their little farms at a fixed rental; the free tillers of the soil had formed themselves into associations to defeat the Statute of Laborers (1349), which fixed the maximum and minimum of wages; the Lollard or Wyclifite preachers were denouncing the idleness and vices of the regular clergy, and they and others (as John Ball) were promulgating social doctrines calculated to make the common people discontented with their lot and hostile to the landholders; the country clergy complained of the tyranny of the Church; the mismanagement of the war, and the incapacity and selfishness of the court party provoked much discontent; there were many discharged soldiers in the country; and moral and religious feeling were sunk to a low ebb. From the fact that the insurgents directed their enmity against himself and the advisers of the king, John of Gaunt saw that he could never hope to succeed in his ambitious schemes in England; and from this time he kept very much in the background, till in 1386 he carried himself

Richard II.

and his restless plottings to Spain and Gascony. Richard in 1390 made him Duke of Aquitaine for life. In 1385 Richard invaded Scotland, and took Edinburgh and burned it; but, not encountering the Scotch, returned home.

About the same year another coalition of the baronial party, headed by Thomas of Woodstock, Duke of Gloucester, began to oppose the king and his chosen friends. They impeached several of them before the Merciless Parliament (1388), and secured convictions and executions. But on May 3, 1389, Richard suddenly declared himself of age, and proceeded to govern on his own responsibility. For eight years he ruled as a moderate constitutional monarch, and the country enjoyed peace—hostilities with France were not renewed after 1388—and was fairly prosperous. But in 1394 Richard's first wife, Anne of Bohemia, whom he had wedded in 1382, died, and two years later he married Isabella, daughter of Charles VI. of France, a girl of eight. From that time he seems to have adopted very largely French tastes, manners, and ideas. At all events, in the Parliament of 1397 he began to assert the pretensions of an absolute monarch. On July 8 he had Gloucester, Arundel, and Warwick arrested on the charge of conspiring against the crown. Arundel was beheaded; Gloucester was sent a prisoner to Calais, and died there in prison, probably murdered, a fortnight after his arrest; and Warwick was banished to the Isle of Man. Thomas Arundel, Archbishop of Canterbury, was also banished. In the following year an obsequious Parliament granted to the king the subsidy on wool for life, and delegated all its authority and power to a commission of 18 members, all supporters of the king.

Richard soon aroused the slumbering discontent of his subjects by his unjust methods of raising money, principally by means of forced loans, and by his arbitrary and despotic rule. In the beginning of 1398 the Duke of Norfolk and the Duke of Hereford (Henry, son of John of Gaunt) were accused to the king of having spoken treason against him. Richard banished them—Norfolk for life and Hereford for 10 years. In January, 1399, John of Gaunt died, and Hereford succeeded him as Duke of Lancaster; but the king refused to give up to the exile the lands of his dead father. Richard in May went over to Ireland, which he had previously visited at the head of a military expedition in 1394–1395. Henry of Lancaster seized on the opportunity afforded by the king's absence, and landed on July 4 (see HENRY IV.). Richard at once hurried back, but had neither heart nor power to withstand his cousin. He submitted to Lancaster at Flint Aug. 19, was carried to London, and placed in the Tower.

Richard III.

On Sept. 29 he resigned the crown, and on the following day was likewise deposed by the Parliament, which chose Henry of Lancaster as his successor.

A month after his resignation Richard was condemned to perpetual imprisonment by Parliament. His fate is wrapped in obscurity, beyond the almost certain fact that he met a violent death, for which it is not altogether clear that Henry IV. was responsible. A month after Henry's accession some noblemen of Richard's party formed a conspiracy to restore Richard to the throne, but their purpose was discovered. No doubt this decided the fate of Richard; at all events, authentic history knows nothing more about him from this time. According to different accounts, either he was murdered in Pontefract Castle, or he starved himself to death, or he escaped to Scotland and died there a lunatic. By nature he seems to have been passionate, impulsive, and excitable; but though capable of bold and energetic action on occasion, his habitual mood was one of indolence. He had a good insight into men's characters; but suffered himself to be influenced by those about him, and generally lacked the will and the steadfast resoluteness to act up to his own better judgment.

Richard III., King of England; son of Richard, Duke of York, a descendant of Edmund, Duke of York, fifth son of Edward III.; born in Fotheringhay Castle, Oct. 2, 1452. After the defeat and death of his father in 1460 he was sent, along with his brother George, to Utrecht for safety, but returned to England after his eldest brother Edward won the crown (1461). Two years later he was created Duke of Gloucester, his brother George being made Duke of Clarence. In the final struggle between the York and Lancaster factions he took an active share; he led the van at the battle of Barnet, rendered valuable aid in winning the fight of Tewkesbury, and is believed, on fairly good evidence, to have had a hand in the murder of Prince Edward, son of Henry VI., who was slain after that battle. All through the reign of Edward IV. he gave valuable and faithful support to his brother, and was rewarded by him with every confidence, and with numerous high offices. He was believed to have been concerned in the murder of Henry VI. in the Tower on May 21, 1471; but the evidence, though strongly pointing in that direction, is not conclusive.

In the following year he married Anne, the younger daughter of Warwick the King-maker, who had been betrothed to the murdered Prince Edward. This alliance was greatly resented by Clarence, who had married the elder sister, and wished to keep all of Warwick's vast possessions in his own hands. Clarence quarreled, too, with King Edward, who in 1478 procured his impeach-

Richard III.

ment by Parliament. The refractory duke was put to death privately in the Tower on Feb. 18. Of this judicial murder Gloucester is likewise accused; but the evidence for his complicity is very slight. In 1482 he was put in command of the army that invaded Scotland. Along with the Duke of Albany he entered Edinburgh; but his one warlike achievement was the capture of Berwick town and castle. In the following year, while still in Yorkshire, he heard of King Edward's death (April 9), and learned that he himself had been named guardian and protector of his son and heir, Edward V., then aged 13. On his way S. the Protector arrested Earl Rivers and Lord Richard Grey, the uncle and step-brother of the



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young king, and confined them in his castles. All who were of the old nobility, and resented the rise of the Woodvilles, rallied round Richard. Whether this accession of strength first suggested to him the idea of making himself king, or whether he had conceived it before, cannot of course be known; but certain it is that from this time Richard of Gloucester schemed for the crown, and by craft, boldness, and utter unscrupulousness carried his project into execution.

The arrest of Rivers and Grey had put the king entirely into his hands, for the

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queen-mother had hastened to take sanctuary at Westminster. On June 13 Gloucester suddenly accused Lord Hastings, an influential member of the council, of treason, arrested him there and then, and had him instantly beheaded. The "crime" for which Hastings died was changing sides from Richard to the Woodville party. On June 16 the queen-dowager was induced to give up, at the demand of Richard and the council, her other son, the little Duke of York. He was put into the Tower to keep his brother, the king, company. On the Sunday following (22d) a certain Dr. Shaw preached at St. Paul's cross that the children of Edward IV. were illegitimate, nay, that Edward IV. himself and his brother Clarence were both born out of lawful wedlock. Three days later the Parliament desired Richard to assume the crown; on the next day (June 26, 1483) he declared himself king, and on July 6 was crowned in state by Cardinal Bouchier. Rivers and Grey were executed at Pontefract on June 25. In point of form Richard was a duly elected king, and Edward V. had not yet been crowned; all the same, his accession was *de facto* a usurpation. Richard's principal supporter all through, from the date of Edward IV.'s death, had been the Duke of Buckingham, a descendant of the Duke of Gloucester, who was privily slain at Calais when Richard II. was king.

Shortly after his coronation Richard set out on a tour through the kingdom, and during the course of it he was surprised by the intelligence that Buckingham was plotting with the friends of Henry Tudor, Earl of Richmond (afterward Henry VII.), the chief representative of the House of Lancaster, to effect his overthrow and proclaim Henry king. But the attempted rising soon collapsed, and Buckingham was taken and on Nov. 2 executed. It seems to have been shortly before this that Richard contrived the foul crime that has branded his name with infamy, and that caused himself inextinguishable remorse to the day of his death—the murder of his nephews in the Tower. The deed was done so secretly by Sir James Tyrrell, one of Richard's devoted followers, and a couple of hirelings, that the nation did not know of it till some time after (see EDWARD V.). Indeed, the very fact of their murder has been seriously called in question, though not till much later times. But from the days of Richard himself he was popularly believed to have effected his nephews' destruction, and evidence supports the popular opinion.

During the remainder of his short reign Richard directed all his energies to baffling the plans of Richmond, and to making preparations to meet the invasion which he saw to be imminent. But he was rapidly losing his hold on the nation, alarming and horrifying it by his crimes and tyrannous acts.

Henry of Richmond at length landed at Milford Haven on Aug. 7, 1485. Richard met him at Bosworth in Leicestershire on the 22d, and there lost his kingdom and his life, fighting bravely like a king, crown on head, in the midst of his foes (see HENRY VII.). The body of the slain king was subjected to great indignities, carried to Leicester, and there, after being exposed for two days, was buried in the Grey Friars churchyard.

Richard's was a strangely mixed character. Its ruling passion was an inordinate craving for power, to gratify which he stopped at no crime, however heinous. He possessed many of the typical qualities of the best of the Plantagenets — a skillful soldier, of great ability and energy, brave, bold, reckless of consequences, fond of display, yet not incapable of nobler impulses. Had he been born the lawful heir to the throne, and succeeded to it peacefully, he would probably have been a great king; for he was a very capable ruler, aiming at the real welfare of his subjects, promoting justice, and furthering religion and morality. Yet circumstances, conflicting with his insatiable ambition, helped the evil tendencies of his nature to get the upper hand; and these grew and hardened as time went on, till his audacity and unscrupulousness were matched with a cunning and hypocrisy such as are seldom found united in one man.

On the other hand, he unquestionably had great charm of manner, and knew how to inspire confidence even in those who had the best reasons for distrusting him. He was liberal, too, and, where his own personal ambition was not directly concerned, just and generous. He was also swayed by a lively sense of divine justice, and more than one religious institution owed its foundation to his bitter remorse for the murder of his nephews. Most of his subjects and contemporaries looked on him as a monster of wickedness; others, however, cherished his memory as that of a wise and good ruler. The real man was probably not quite so black as the Lancastrian (Tudor) chroniclers have painted him, though their portrait is probably fairly accurate in its broad features. In person Richard was short of stature and slight of build, with one shoulder slightly higher than the other; but there is no evidence that he was a hunchback. His face was thin and intelligent, and in portraits wears a look of sadness.

Richard Leander. See VOLKMANN, RICHARD VON.

Richard of Cirencester, or Ricardus Corinensis, a monkish chronicler of the 14th century, sometimes called the Monk of Westminster. He entered the Benedictine monastery of St. Peter's, Westminster, England, residing there during the remainder of his life; in 1391 he visited Rome. He

was the author of a Latin history of England to the year 1348. The so-called Itinerary of Richard "On the Situation of Britain" (1758), formerly much referred to as an authority on Roman Britain, was a forgery perpetrated by Dr. C. J. Bertram, of Copenhagen. Richard died in his monastery about 1402.

Richard of Cornwall, Emperor of Germany; second son of John, King of England; born Jan. 5, 1209. In 1225-1226 he and his uncle, William of Salisbury, commanded an expedition which recovered Gascony, and the next year he received Cornwall as the result of a rising of the earls to compel the king (Henry III.) to make provision for him. He managed his money matters well, and his wealth, as well as his prudence, saved Henry in many an impending crisis. For some years he acted with the English barons, to many of whom he was closely related by his marriage with Isabel, Countess of Gloucester, daughter of the Earl of Pembroke. In 1232 he was one of the leaders in the opposition to Hubert de Burgh; and in 1238 he headed an armed rising provoked by the king's secret marriage of his sister to Simon de Montfort. But Richard was still heir to the throne, and the articles which Henry was prepared to sign, and which dismissed his foreign advisers, appeared to the earl to bind the king's hands too closely, and he drew back. In 1240-1241 Richard was away on a crusade, and the next year he was with his brother in Gascony; and in 1244 he married Sanchia of Provence, sister of Queen Eleanor, and this second marriage drew him away from the baronage. In 1252 he refused the Pope's offer to sell him the crown of Sicily; but in 1257 he was elected by a majority titular king of the Romans, and was soon afterward crowned at Aix-la-Chapelle; and he was skillful enough to maintain a certain hold on Germany, lavishing his wealth to maintain his own position and the dignity of the empire. In the great struggle which took place between Henry III. and his nobles Richard at first acted as a peacemaker. Subsequently, however, he sided with his brother against Simon de Montfort; and he was taken prisoner at Lewes, and imprisoned for a year, till the battle of Evesham (1265) set him free. In 1267 he was a third time married, to Beatrice, niece of the Elector of Cologne. Richard died at Kirkham, Dec. 12, 1271, broken-hearted at the loss of his eldest son, Henry, who was murdered at Viterbo by the Montforts, and immortalized by Dante. Two other sons died also without issue.

Richards, Alfred Bate, an English journalist and dramatist; born in Baskerville House, Worcestershire, England, Feb. 17, 1820. He produced many tragedies, among them being: "Cræsus, King of Lydia"; several volumes of poems, including "Death

and the Magdalen" (1846); "The Dream of the Soul" (1848); and one novel, "So Very Human" (1871), the title being suggested by a chance phrase of Charles Dickens. In his "Britain Redeemed and Canada Preserved" (1848), he foreshadowed, 30 years before its construction, the inter-oceanic railway between the Atlantic and the Pacific. He died in London, June 12, 1876.

Richards, Brinley, a British pianist and composer; born in Carmarthen, Wales, in 1819; began to study music at the Royal Academy in London about 1835; and on the completion of his studies soon won a good position in London as a pianist and teacher of music. He was for many years a professor of the Royal Academy. His compositions for sacred and part songs and for the pianoforte won great popularity, especially his "God Bless the Prince of Wales." Richards bestowed much attention on the study and encouragement of Welsh music. He died May 1, 1885.

Richards, Charles Brinckerhoff, an American engineer; born in Brooklyn, N. Y., Dec. 23, 1833; was superintendent of Colt's Arms Company, of Hartford, for many years, and of the Southwark Foundry and Machine Company, Philadelphia, in 1880-1884; and was consulting engineer for many public buildings. In 1884 he became Higgins Professor of Mechanical Engineering in Yale University. In 1861 he invented the Richard's indicator for steam engines; was one of the United States expert commissioners to the Paris Exposition in 1889; a member of many American and foreign scientific societies; and editor of the engineering and technical terms in "Webster's International Dictionary."

Richards, Charles Herbert, an American clergyman; born in Meriden, N. H., March 18, 1839; was graduated at Yale University in 1860, and at the Andover Theological Seminary in 1865; and afterward served in the ministry of the Congregational Church. He conducted the Monona Lake Assembly in Madison, Wis., in 1881-1884; was president of the Wisconsin Home Missionary Society in 1885-1890; lectured on Hymnology and Church Music at Yale University in 1895; and was one of the executive committee of the Congregational Home Missionary and Ministerial Relief Societies. He was the author of "Religious Rights of a Christian State"; "The Improvement of Worship"; "Evolution of a Redeemed Humanity"; "What is Your Life?"; "God Our Help"; etc.

Richards, Edgar, an American chemist; born in New York, Feb. 23, 1858; took a course in chemistry at the School of Mines in Columbia University in 1876-1881; was assistant chemist in the United States Department of Agriculture in 1882-1887; assistant chemist in the Internal Rev-

enue Bureau of the United States Treasury Department in 1887-1892; president of the Washington Chemical Society in 1889; and a member of many scientific societies. He was the author of "Principles and Methods of Soil Analysis" (1886); "Some Food Substitutes and Adulterants"; etc.

Richards, Laura Elizabeth, an American writer of juvenile books, daughter of Julia Ward Howe; born in Boston, Mass., in 1850. She published a great number of children's books, among them: "Five Mice" (1880); "Our Baby's Favorite" (1881); "Tell-Tale from Hill and Dale" (1886); and "Toto's Merry Winter" (1887); "Captain January" (1890); "Nautilus" (1895); "Love and Rocks" (1898); "Snow White" (1900); etc.

Richards, William Trost, an American landscape and marine painter; born in Philadelphia, Pa., Nov. 14, 1833. He was a student of Paul Weber and later studied in Europe, at Florence, Rome, and Paris. From 1878 till 1880, he had a studio in London, England. He then returned to Philadelphia. He was an honorary member of the National Academy. At the Metropolitan Museum, in New York city, is a series of 47 water-color marines and landscapes, painted by him in 1871-1876. His "Wissahickon" was on exhibition at the Centennial Exposition in 1876. In the Corcoran Art Gallery, Washington, D. C., is hung his "On the Coast of New Jersey." Among his best-known paintings in oil are: "Midsummer," which was first exhibited in 1862; "Woods in June" (1864); "Land's End" (1880); "Old Ocean's Gray and Melancholy Waste" (1885). He died Nov. 8, 1905.

Richardson, Abby Sage, an American lecturer and writer on literary topics; wife of Albert Deane Richardson; born in Massachusetts, in 1837. She first essayed the stage. Her publications include: "Stories from Old English Poetry" (1871); "The History of Our Country to 1876" (1876); "Familiar Talks on English Literature" (1881); "Old Love Letters" (1883); "Abelard and Heloise: A Mediæval Romance" (1884); "The Colonial Girl" and "The Pride of Jennico" (written in collaboration with Grace Furniss); etc. She made a number of adaptations for the stage, principally from the French. She died in Rome, Italy, Dec. 5, 1900.

Richardson, Albert Deane, an American journalist; born in Franklin, Mass., Oct. 6, 1833. He was famous as the war correspondent of the New York "Tribune" during the Civil War, and was imprisoned with others for 18 months as a result of their undertaking to run the batteries of Vicksburg on two barges. The result of his experience was the work: "The Field, the Dungeon, and the Escape" (1865). He also wrote: "Beyond the Mississippi" (1866), and "A Personal History of Ulysses S.

Richardson

Grant" (1868). A collection of his miscellaneous writings was published by his widow, Abby Sage Richardson, under the title of "Garnered Sheaves" (1871). He was murdered by Daniel McFarland in New York city, dying Dec. 2, 1869.

Richardson, Benjamin Ward, an English physician; born in Somerby, Leicestershire, England, in 1828; was graduated in medicine at St. Andrews University in 1854. In 1855 he edited the "Journal of Health"; and he gained the Astley Cooper prize by his treatise on "The Cause of the Coagulation of the Blood," and the Fothergillian gold medal by a disquisition on the "Diseases of the Fœtus," in 1856. He originated the use of ether spray for the local abolition of pain in surgical operations, and introduced methylene bichloride as a general anæsthetic. He was a fellow of the Royal College of Physicians and of the Royal Society, and president of the Medical Society of London. He published several works, and was an earnest sanitary reformer. Knighted in 1893; died in 1896.

Richardson, Charles, an English lexicographer; born in July, 1775. He was trained as a barrister, but devoted himself to literature. In 1815 he published "Illustrations of English Philology." In 1818 he undertook the lexicographical articles in the "Encyclopædia Metropolitana," and afterward published his great work, "A New Dictionary of the English Language" (1835-1837). He also wrote a work on the "Study of Languages" (1854), and contributed frequently to the "Gentleman's" and other magazines. He died in Feltham, near London, England, Oct. 6, 1865.

Richardson, Henry Hobson, an American architect; born in New Orleans, La., in 1838; was graduated at Harvard in 1859; entered the École des Beaux Arts in Paris in 1860, where he speedily gained a reputation as a most promising pupil. In 1868 he returned to the United States, and entered on a remarkably successful professional career. He designed some of the most beautiful buildings in this country, notably Trinity Church, Boston; the building of the Boston and Albany railroad, at Springfield, the Albany city hall, the Buffalo Lunatic Asylum, the Cambridge Law Schools, and the new capitol in Albany. He died in Boston, Mass., April 28, 1886.

Richardson, Sir John, a British naturalist and Arctic traveler; born in Dumfries, Scotland, Nov. 5, 1787. After studying medicine at the University of Edinburgh he entered the royal navy, in 1807, as assistant-surgeon. He served on various stations till 1819, and was surgeon and naturalist to the Arctic expeditions of 1819-1822 and 1825-1827, under Sir John Franklin, exploring on the latter occasion the shores of the Arctic Ocean between the Mackenzie

Richardson

and Coppermine rivers. He wrote "Geognostical Observations" as an appendix to the "Narrative" published by Franklin (1829, London), and edited, along with Kirby and Swainson, the "North American Fauna" (4 vols. 1829-1837). In 1838 he was appointed physician to the fleet, and in 1846 was knighted. In March, 1848, he took charge of an expedition to search for Franklin, and on his return published "The Arctic Searching Expedition" (1851) and "The Polar Regions" (1861). He died near Grasmere, England, June 5, 1865.

Richardson, Samuel, an English novelist; born in Derbyshire, in 1689. Like Matthew Prior, he was the son of a joiner; but unlike him, he made no effort to obscure his origin. "My father," he said, "was a



SAMUEL RICHARDSON.

very honest man, descended from a family of middling note. My mother was also a good woman, of a family not ungenteel." His career is a curious exemplification of the truth of that Horatian precept which Thackeray chose for the motto of "Esmond." It preserved to the end the characteristics of its outset. The man who was afterward the moralist of Salisbury Court was as a boy the "Gravity" and "Serious" of his school-fellows; the novelist who penned the interminable epistles of Clarissa and Harriet Byron was as a youth the favored and indefatigable amanuensis of half the girls in the neighborhood, acquiring in this artless office something of that strange knowledge of the minuter mechanism of the feminine mind which is so conspicuous a feature of his genius. He says of himself that he had only "Common school-learning"; but he appears to have been at Christ's Hospital. In 1706, at the age of 16, he was bound by his own wish to John Wilde of Stationers' Hall, a printer, with whom he served the usual period, ultimately completing the orthodox programme of exemplary apprenticeship by marrying

his master's daughter. From 1713 to 1719 he worked as a journeyman printer. In the latter year he opened an establishment of his own in the center, and later in the N. W. corner (No. 11) of Salisbury Square, then Salisbury Court. His printing office and warehouses were in Blue Ball Court, on the E. side of the square.

In a sober, methodical way he continued to prosper, perfecting his faculty for letter-writing in various ways, and serving the humbler needs of literature by diligent compilation of prefaces, indexes, advertisements, and the like. He printed more than one newspaper, and by the favor of Speaker Onslow obtained the printing of the journals of the House of Commons, 26 volumes of which passed through his establishment. Then, in 1740, came the opportunity which transformed him into a literary celebrity. To use his own words, "he accidentally slid into the writing of 'Pamela.'" He was over 50 when two bookselling friends invited him to prepare a volume of familiar letters "in a common style, on such subjects as might be of use to those country readers who were unable to indite for themselves." He caught at the idea, super-adding another. "Will it be any harm," he said, "in a piece you want to be written so low, if we should instruct them how they should think and act in common cases?" "Hence sprung 'Pamela,' published in November, 1740. Its title was as leisurely as its method: 'Pamela: or Virtue Rewarded.' In a series of familiar letters from a beautiful young damsel to her parents. Published in order to cultivate the principles of virtue and religion in the mind of the youth of both sexes. A narrative which has its foundation in truth; and at the same time that it agreeably entertains by a variety of curious and affecting incidents, is entirely divested of all those images which, in too many pieces calculated for amusement only, tend to inflame the minds they should instruct."

The moral note is explicit enough on the good printer's title-page; but for all that "Pamela" is by no means *ad usum Delphini*. Its vogue, in a coarser and robuster age than ours, was nevertheless extraordinary. Not to have read of Richardson's exemplary heroine was "as great a sign of want of curiosity, as not to have seen the French and Italian dancers." Divines extolled her from their pulpits; Pope declared she would do more good than their discourses; fine ladies triumphantly exhibited her popular chronicles at places of amusement; and in remote country villages, when at last she was happily married, her rustic admirers set the bells a-ringing. In February followed a second edition; a third succeeded in March, and a fourth in May. Grub street fastening promptly on this unexampled popularity, hastily put together for sequel

a "Pamela in High Life," which had the unfortunate effect of seducing Richardson into two supplementary volumes, now forgotten; and then Henry Fielding fluttered the Salisbury Court dovecote by producing what Richardson and his coterie regarded as the "lewd and ungenerous engraftment" of "Joseph Andrews."

Eight years elapsed before Richardson published another novel. But during this time, consoling himself for the coarse sallies of the irreverent by the "soft adulation" of a little circle, chiefly of the gentler sex, who gathered round him in his suburban home at Hammersmith, he continued, either in his snug writing-closet or his summer house to work placidly at his masterpiece — "Clarissa; or the Adventures of a Young Lady," known generally as "Clarissa Harlowe." Virtue, in this performance, was not "rewarded," but ruined. The heroine is nevertheless drawn with a tenacity of insight to which "Pamela" could scarcely pretend; and the chief male character, that of Lovelace, though more of an abstraction, is scarcely inferior. Johnson declared the book to be the first in the world for its knowledge of the human heart; and even Fielding did not refuse his tribute: "Such simplicity, such manners, such deep penetration into nature, such power to raise and alarm the passions, few writers, either ancient or modern, have been possessed of" ("Jacobite Journal," No. 5). Lesser voices swelled the chorus with greater energy, and it was repeated across the Channel with Gallic enthusiasm. The high-priest of sentiment, Diderot, did not scruple to name its author with Homer and Euripides; and as if to prove that this was no momentary Anglomania, in our own day the poet Alfred de Musset proclaimed it to be "*le premier roman du monde*." But from France also came its compactest condemnation, "*La nature*," said D'Alembert, "*est bonne à imiter, mais non pas jusqu'à l'ennui*."

Having drawn the ideal woman in "Clarissa," Richardson proceeded, some five years later, to portray, in "Sir Charles Grandison," the perfect man — "the man of true honor." This is a work of much greater ability than "Pamela," but still far below "Clarissa." It has, moreover, no central story strong enough to reconcile the reader to the prolix impeccability of its superfine hero, whom M. Taine, with an unwonted burst of critical levity, suggests should be stuffed and canonized for his wearisome good qualities. Besides a solitary essay in Johnson's "Rambler" (No. 97), and the voluminous but not very interesting correspondence published (with an excellent memoir) by Mrs. Barbauld in 1804, Richardson left no other literary remains of any importance. In later life a nervous habit grew upon him, which terminated in 1761 by a fit of apoplexy, of which he died. He has

Richardson

left his own portrait in his letters to Lady Bradshaigh; but it might also have been deduced from his letters. He was a sentimental, purring, methodical, well-meaning little man, domesticated and affectionate, whose fitting environment was feminine society of the sympathetic sort; and he has repaid the gentle caresses with which his worshipers tempered the wind of adverse criticism to his sensitive soul by depicting their sex in return with a patience, a discrimination, a sustained analysis of secret spring and motive which it has been given to no other male author, living or dead, to achieve. It is the most unequivocal testimony to his native genius that his impracticable method of telling his story by correspondence, and his intolerable circumstantiality and diffuseness (he thinks nothing of an epistle of 15 pages, and *Clarissa* takes 19 for her will) have only served to tighten his hold on his reader, and to emphasize and intensify the reality of his creations.

Richardson, William Adams, an American jurist; born in Tyngsboro, Mass., Nov. 2, 1821; was graduated at Harvard University in 1843, and at its law school in 1846, and was admitted to the Boston bar in 1848. In 1856 he was appointed judge of the probate court of Middlesex county, and in 1869, assistant secretary of the United States Treasury, becoming secretary in 1873. He resigned that office in 1874 to accept a seat on the bench of the United States Court of Claims, being made chief-justice of the court in 1885. He was Professor of Law at Georgetown College and Columbian University for many years, and the author of numerous publications dealing with financial subjects. He died in Washington, D. C., Oct. 19, 1896.

Richardt, Christian Ernst, a Danish poet; born in Copenhagen, Denmark, May 25, 1831. His poems are noted for religious depth, delicacy, and patriotic enthusiasm. He is considered first among the later lyrical poets of Denmark. His first book was "*Deklarationen*" (1851), a comedy, followed by "*Short Poems*" (1861); "*Pictures and Songs*" (1874); "*Fifty Poems*" (1878); "*Spring and Autumn*" (1884); and "*Miscellaneous Poems*" (1891). He also wrote a tragic musical drama, "*King and Constable*" (1878). He died in 1893.

Richebourg, Jules Emile, a French dramatist; born in Meuvy, Haute Marne, France. In 1850 he made his first appearance in Paris and after a short experience in a commercial house, obtained a place on the staff of "*Figaro*." For a term he wrote fugitive verses, but, after several unsuccessful attempts, he produced, in 1862, a five-act drama, "*Nights in the Place Royale*," of which Leon Pournin was joint author. In the following year he was yet more successful, with a comedy vaudeville called

Richelieu

"*A Modern Household*." His first successful novel, "*Lucienne*," appeared in 1858, and from that time he turned out many melodramatic tales. He became literary and dramatic critic of "*Le Petit Journal*," a member of the Directory of the *Societe des Grus de Lettres*, and a knight of the Legion of Honor. He died in Bougival, France, Jan. 26, 1898.

Richelieu, Armand Jean Duplessis, Cardinal, Duc de, a French statesman; born of a noble but impoverished family in Richelieu, 12 miles S. S. E. of Chinon, Sept. 5, 1585. He abandoned a military career for the Church, in order to keep in the family the bishopric of Luçon, to which he was consecrated at 22. Representative of the Poitou clergy at the States-general in 1614, he attracted the notice of the queen-mother, and rose in 1616 to be secretary at war and foreign affairs; but the downfall of Marshal d'Ancre, the queen-regent's fa-



CARDINAL RICHELIEU.

vorite, in April, 1617, sent him back to his diocese. At length in August, 1620, the queen-mother and the young king were reconciled, mainly through the agency of the celebrated Capuchin Father Joseph — "*l'éminence grise*" of later days, till his death in 1638, the intimate friend of Richelieu. The latter showed much tact and patient forbearance in his measures; he formed an alliance with the powerful Duc de Luynes, and in 1622 was named cardinal, in 1624 Minister of State. This position he retained to the end of his life, in spite of countless court intrigues, and ere long the most powerful open and secret opposition from the queen, Gaston, Duke of Orleans, and a host of minor intriguers, first among whom was the too famous Duchess de Chevreuse.

His first important measure was the blow to Spain of an alliance with England, cemented by the betrothal (1625) of the king's sister, Henrietta, with Charles, then Prince of Wales. In the Valtelline war he cleared the country of the Spanish and papal troops, but was unable to pursue his advantage, and had to submit to the terms of the peace of Monzon (1626). His next task was to destroy the political power of the Huguenot party. After a 15 months' siege, which he conducted in person, concentrating all his energy on the task, the great stronghold of La Rochelle was starved into submission, Oct. 30, 1628. He next turned to crush Rohan and the Languedoc rebels, and destroyed the proud walls of Montauban, last refuge of Huguenot independence. Early in 1630 he entered Italy with a splendid army, himself in command, and soon reduced Savoy to submission. Meanwhile he plunged into dark and tortuous intrigues with the Italian princes, the Pope, and with the Protestants in the N. against the House of Austria. He promised a large subsidy to Gustavus Adolphus, and, through the masterly diplomacy of Father Joseph at the Ratisbon Diet in June, 1630, succeeded in persuading Ferdinand to dismiss Wallenstein. The first treaty of Cherasco (April, 1631), ended the Italian war, the second gave France the important strategic position of Pinerolo.

Just before this final triumph Richelieu had successfully surmounted the greatest danger of his life—a great combination formed for his downfall by the queen-mother, Gaston of Orleans, the House of Guise, Bassompierre, Créqui, and the Marillacs. She tried to bully the king by her violence, but Richelieu followed his master to Versailles, and again had the whole power of the realm placed entirely in his hands. So ended "the Day of Dupes" (Nov. 11, 1630). The queen-mother fled to Brussels, Bassompierre went to the Bastille, Gaston fled to Lorraine. The cardinal was now made duke and peer, and Governor of Brittany. Further intrigues and attempted rebellions by the emigrant nobles and governors of provinces were crushed with merciless severity—Marillac and Montmorency and other nobles were sent to the block. Meantime Gustavus Adolphus had run his brief and brilliant course; and his death at Lützen removed an ally with whom it might have become difficult to reckon. In July, 1632, Richelieu had seized the duchy of Lorraine. He continued his intrigues with the Protestants against Ferdinand, subsidizing them with his gold, but till 1635 he took no open part in the war. In May of that year, after completing his preparations and concluding a close alliance with Victor Amadeus of Savoy, Bernhard of Saxe-Weimar, and the Dutch, he declared war on Spain, and at once placed in the field an army of 132,000 men. But his first

efforts were singularly unsuccessful, and in 1636 Piccolomini and the Cardinal-Infante, Governor of the Netherlands, entered Picardy, crossed the Somme, and threatened Paris itself.

In this hour of peril Richelieu rose to the height of his genius, and awoke a new and irresistible force as he threw himself on the patriotism of France. With 30,000 foot and 12,000 horse he swept the enemy out of Picardy, while his ally Bernhard drove them across the Rhine, and in 1638 destroyed the imperial army in the decisive battle of Rheinfelden, a victory which opened to him the gates of the key-fortress of Breisach. The unexpected death of Bernhard threw the fruit of his victories into the hands of Richelieu, whose policy soon bore further fruit in the disorganization of the power of Spain—revolts in Catalonia, and the loss of Portugal; the victories of Wolfenbüttel (1642) and Kempten (1642) over the Imperialists in Germany; and at length in 1641 in Savoy also in the ascendancy of the French party. Another triumph that same year was the speedy collapse of the Imperialist invasion in the N. by the Count of Soissons, who perished in the first battle. The failure to capture Tarragona was the one exception to the complete triumph of the cardinal's latest years.

The hatred of the great French nobles to his rule had never slumbered, however, and Richelieu found safety alone in the king's sense of his own helplessness without him. He was firmly convinced that the only safe government for France was a strong absolutism uncontrolled either by the selfish ambition of the nobles or the constitutional legalism represented by the Parlement of Paris. The last conspiracy against him was that of the grand-equerrie, the young Cinq-Mars, whose intrigues with Gaston, the Duke of Bouillon, and the Spanish court were soon revealed to the cardinal, the center of a network of espionage which covered the whole of France. When the hour was ripe he placed in the king's hands at Tarascon proofs of the traitorous plot with Spain, and was given full powers as lieutenant-general of the realm. Cinq-Mars and De Thou were at once arrested, and the wretched coward, Gaston of Orleans, hastened after his kind to buy his own security by betraying his accomplices. Cinq-Mars and De Thou were executed at Lyons in the autumn of 1642. But the great minister was himself dying in the hour of his greatest triumphs. Death had often drawn near him, but the strong will and fiery soul within his frail and feeble frame had thrust him aside and retained the fleeting life. He faced the inevitable at last with calm tranquillity—when the priest bade him forgive his enemies, he made answer, "I have never had any other enemies than the State's." We see the same unhuman impersonality

in the identification of himself with the State in his "Memoirs"—"I have been severe to some in order to be good to all. . . . It is justice that I have loved and not vengeance. . . . I wished to give to Gaul the limits that nature had marked out for her . . . to identify Gaul with France, and wherever the ancient Gaul had been, there to restore the new." He died Dec. 4, 1642, bequeathing Mazarin to the king as his successor.

Richelieu built up the power of the French crown, he achieved for France a preponderance in Europe, and throughout life he moved onward to his goal with the strongest tenacity of purpose, unmoved either by fear or pity. He destroyed the local liberties of France, and crushed every element of constitutional government, and his policy overwhelmed the citizens with taxation and made waste places some of her fairest provinces and most thriving towns. Our judgment of him will always differ according as we examine his end or his means—the public or the private man. He never sacrificed to personal ambition the interests of his country as these seemed to himself, but he often forgot in his methods the laws of morality and humanity. There is no need here to discuss the more fundamental question of whether his end was actually identical with the highest good of France—the best defense that even so redoubtable a Chauvinist as Henri Martin can offer is that he merely developed out to the full tendencies long rooted in French soil, and that no other ideal of a policy was then possible for France, but a systematic absolutism under a beneficent despot. Nor have we sympathy to spare for the corrupt and selfish nobles whom he crushed with a severity so merciless that he drove 21 persons into exile, all of them the greatest names in France, banished 65, several of these ladies, while 73 nobles were flung into prison, and 43 were either beheaded or died in prison.

We know the face of Richelieu best from Philippe de Champagne's picture in the Louvre, in which the energy of the model has passed into the hand of the artist. A pale apparition, the mere ghost of a great man in Michelet's phrase, neither flesh nor blood, but all intellect, as Quinet said of Voltaire, he looks down on us still with that steady and penetrating eye and that imperious gesture that overawed the king and the proudest peers of France. The weakest point in Richelieu's character was his literary ambition and the extraordinary pains he took to construct a literary reputation. His own plays, for the fate of which he trembled with anxiety, sleep in safe oblivion, but his "Memoirs" are still read with interest, forming a subtle and elaborate panegyric on himself, so that Michelet says in his paradoxical manner, yet not without truth, "If one would not know

Richelieu, one should read his "Memoirs." He founded the French Academy. His Correspondence and State Papers, edited by d'Avenel, fill eight volumes of the "Collection de Documents inédits sur l'Histoire de France" (1853-1877).

Richelieu, Louis François Armand du Plessis, Duc de, a Marshal of France, descended from the same family as the Cardinal; born in 1696. After the death of Louis XIV., he was admitted into the court of the Regent; the Duke d'Orleans and he largely participated in its profligacy. He was sent to the Bastille in 1716, for fighting a duel with the Count de Gacé, and again in 1719, as an accomplice with the Spanish ambassador in a conspiracy against the Regent. He distinguished himself under Villars, and afterward at Kehl, Philipsburg, Dettingen, and Fontenoy; conquered Minorca, forced the Duke of Cumberland to submit to the capitulation of Klosterseven, and devastated the electorate of Hanover. In 1781, he obtained the rank of dean of the French marshals; and he concluded his long career, varied with acts of heroism and villainy, in 1788.

Richepin, Jean, a French poet and novelist; born in Médéah, Algiers, Feb. 4, 1849. He first attracted attention by his volume of poems "The Song of the Beggar" (1876), which sent him to prison, where he wrote "Curious Deaths" (1887). A most prolific and audacious writer, he was faithful to his principles, or the lack of them, in all his works: They include: "Caresses" (1877), "Blasphemies" (1884), and "The Sea" (1886), in verse; "Mme. André" (1874); "Brave Men" (1888); "The Cadet" (1890); the dramas "Monsieur Scapin" (1886), "The Filibuster" (1888), and "By the Sword" (1892).

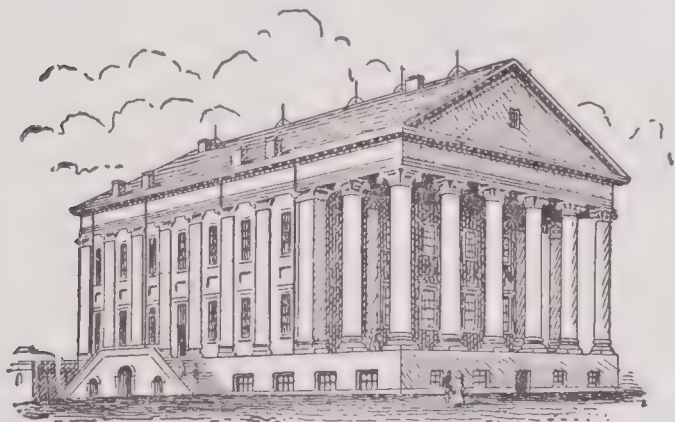
Rich Hill, a city in Bates co., Mo.; on the Osage river, and on the Missouri Pacific, and the Kansas City, Fort Scott and Memphis railroads; 85 miles S. of Kansas City. It is in the heart of the largest coal regions of Missouri; has waterworks, street railroads, and electric light plants, State banks, and several newspapers, and contains coal mines, cigar, and canning factories, vitrified brick works, flour mills, a distillery, foundry, zinc smelters, and machine shops. Pop. (1890) 4,008; (1900) 4,053; (1910) 2,755.

Richmond, a city and county-seat of Wayne co., Ind.; on the Whitewater river, and on the Grand Rapids and Indiana, and the Pittsburg, Cincinnati, Chicago, and St. Louis railroads; 69 miles E. of Indianapolis. The Friends form a large element of the population, and have two important educational institutions, Earlham College, and Friends' Academy. The city is also the place of the Yearly Meeting of the

Orthodox Friends of Indiana. It has electric street railroads, gas and electric lights, waterworks, Home for Friendless Women, State Hospital for the Insane, St. Stephen's Hospital, a high school, National and private banks, and a number of daily, weekly, and monthly periodicals. Richmond has many industries, including flour and lumber mills, and manufactories of clothing, paper bags, paper, pianos, tile, desks, church furniture boilers, traction engines, steam engines, carriages and wagons, bicycles, lawn mowers, plows, threshing machines, grain drills, etc.; and an assessed property valuation of nearly \$12,000,000. The city was founded by a colony of Friends in 1815. Pop. (1890) 16,608; (1900) 18,226; (1910) 22,324.

Richmond, a town in Madison co., Ky.; 25 miles S. E. of Lexington. It is memorable as the scene of one of the most desperate battles of the Civil War. The Confederate general, E. Kirby Smith, in command of 18,000 troops, attacked a much larger Union army under command of Gens. M. D. Manson and William Nelson, and after a three hours' battle utterly defeated the Union forces, whose loss including killed, wounded and prisoners, was 5,000. The town contains the Central University and the Madison Female Institute. Pop. (1890) 6,870; (1900) 4,653; (1910) 5,340.

Richmond, a city, port of entry, capital of the State of Virginia, and county-seat of Henrico co.; on the James river, and on



RICHMOND STATE CAPITOL.

the Southern, the Richmond, Fredericksburg, and Potomac, the Atlantic Coast Line, and the Chesapeake and Ohio and Seaboard Air Line railroads; 116 miles S. E. of Washington, D. C. The city is about 127 miles from the ocean. The James river is navigable for large vessels and there is steamboat communication with Philadelphia, New York, Portsmouth, Norfolk and other Atlantic ports. The city is built on seven hills, and is surrounded by beautiful scenery.

Business Interests.—There are upward of 600 manufacturing establishments, of

which nearly 90 are engaged in the tobacco industry, the remainder being of flour, paper, fertilizer, iron, steel, etc. A number of its flour mills and one of its rolling mills are among the largest in the United States. The chief exports are tobacco and flour. The leading commercial institutions are the Chamber of Commerce, Corn and Flour Exchange, the Tobacco Exchange, and the Stock Exchange. There are 5 National and several other banks, and many daily, weekly, monthly, and other periodicals. The assessed property valuation exceeds \$66,000,000, and the total bonded debt is about \$7,000,000.

Public Interests.—The city covers an area of 5 square miles; and has 116 miles of streets, of which 23 miles are paved; a system of waterworks that cost \$2,500,000, with 100 miles of mains; and sewer system covering 53 miles. The streets are lighted by gas and electricity, at a cost of over \$44,000 per annum; the police department costs annually about \$96,000, and the fire department costs about \$94,000. There is a public school enrollment of nearly 12,000 pupils and annual expenditures for public education of over \$166,859.21. The annual cost of maintaining the city government exceeds \$1,500,000. The death rate averages 18.57 per 1,000 annually. The capitol, which stands on Shockoe Hill, and is surrounded by most of the other public buildings, is an imposing structure, dating from 1785. In the Central Hall, surmounted by a dome, are a statue of Washington and bust of Lafayette, Gen. Fitz Hugh Lee, and others. The Senate Chamber, to the right, was used as the Confederate House of Representatives during the Civil War. The House of Delegates, to the left, contains portraits of Chatham and Jefferson, and was the scene of Aaron Burr's trial for high treason in 1807 and of the State Secession Convention in 1861. The executive mansion of the Confederate States, formerly the residence of Jefferson Davis, has been converted into a museum which contains many relics of the Civil War. The other notable public buildings include the City Hall, State Library, State Penitentiary, almshouse, custom house, etc. The prominent educational institutions are Richmond College (Bapt.), St. Joseph Female Academy (R. C.), the Medical College of Virginia, University College of Medicine, Women's College, and Mechanic's Institute.

History.—Richmond is said to have first been settled in 1609. Fort Charles was built as a defense against the Indians in 1644-1645. The city was incorporated in 1742, and became the capital of the State in 1779. In 1811 the burning of a theater destroyed the lives of 70 persons, including the governor of the State. In June, 1861,

it was selected as the Confederate capital, and from that period was the objective point of a series of formidable military expeditions for its capture, under Generals McDowell, McClellan, Burnside, Hooker, Meade, and Grant, and defended by Gen. Robert E. Lee, with a large army and formidable lines of fortifications. Pop. (1890) 81,388; (1900) 85,050; (1910) 127,628.

Battles around Richmond.—During the last three years of the Civil War (1862–1865) battles raged all round Richmond, and remains of the fortified lines constructed to protect the city are visible in various parts of the environs. Both the inner and outer fortifications may be seen from the Brook Road, which leads to the Lakeside Club House, with its golf links, bowling alleys and boating lake. The chief direct attack on Richmond was made on May 15, 1862, when the Union fleet attempted, without success, to force its way past the batteries at Drewry Bluff, on the James river, 7 miles below the city. Simultaneously General McClellan advanced with the land forces up the peninsula between the York and James rivers and invested Richmond on the E. and N. This led to the hardly contested but indecisive battle of Seven Pines or Fair Oaks (May 31, 1862), in which the Confederates under Gen. Joseph E. Johnson attacked McClellan's left wing, to the S. of the Chickahominy. Large cemeteries and a park now mark the spot, 7 miles to the E., reached by the West Point railroad. The district is swampy, and McClellan lost more men by pestilence than in fighting. Gen. Robert E. Lee now assumed command of the Confederate forces and made an attempt, in combination with Gen. "Stonewall" Jackson, to overwhelm McClellan's right wing, which was posted at Mechanicsville, on the Chickahominy, 5½ miles to the N. of Richmond, and thus began the famous Seven Days' Battle (June 28–July 2, 1862). Mechanicsville was followed by the battles of Gaines's Mill, Cold Harbor, Savage's Station, Frazier's Farm, and Malvern Hill. The upshot of this series of contests, in which 40,000 men fell, was the relief of Richmond, as the Union troops were compelled to retreat to Malvern Hill, 15 miles to the S. E., where they repelled the Confederates in their last attack but soon after withdrew to Harrison's Landing, on the James River. During 1863 there were no direct attacks on Richmond. In May, 1864, General Grant marched down through the "Wilderness" and attacked Lee in his entrenched position at Cold Harbor (June 3, 1864), and lost 15,000 men without making much impression on the enemy. He then transferred his army to the S. side of the James; and the later stages of the war were

rather a siege of PETERSBURG (*q. v.*) than of Richmond.

Richmond College, a coeducational institution in Richmond, Va.; founded in 1832, under the auspices of the Baptist Church; has grounds and buildings valued at over \$800,000; endowment funds exceeding \$450,000; scientific apparatus, etc., \$20,000; volumes in the library, about 16,000; ordinary income, \$50,000; average number of faculty, 25; average student attendance, 460.

Richmond, Legh, an English religious writer; born in Liverpool, Jan. 29, 1772; was the author of three famous tales of village life, circulated as tracts in many languages. They are entitled: "The Dairyman's Daughter," "The Negro Servant," and "The Young Cottager," and were printed under the title of "Annals of the Poor" (1814). He also edited "The Fathers of the English Church" (1807–1811). He died in Turvey, Bedfordshire, May 8, 1827.

Richmond, William Emerson (familarly known as BILLY EMERSON), an American minstrel; born in Belfast, Ireland, about 1846; came to the United States when a year old; and made his first appearance as a balladist and jig dancer in 1857. He died in Boston, Mass., Feb. 23, 1902.

Richter, Eugen, a German politician; born in Düsseldorf, Germany, July 30, 1838. He entered the Prussian Diet in 1869, and the Imperial Diet in 1871, and was the able and acknowledged leader of the Progressist Liberals. He was the author of several economic works, and an authority on financial questions. He died March 10, 1906.

Richter, Gustav, a German painter; born in Berlin, Germany, Aug. 31, 1823. He was a member of the Academies of Berlin, Munich, and Vienna; executed frescoes in the Berlin Museum, and attracted attention by his "Raising of Jarius' Daughter" and his "Building of the Pyramids," a colossal picture (at Munich). He received medals at the exhibitions in Brussels and Vienna in 1873, at Philadelphia in 1876, at Munich in 1883, and second class medals at the Paris Salon 1857 and 1859, and at the Paris Exposition. It is on his portraits, however, that his fame chiefly rests, his sitters having included many European celebrities. There are works by him in the National Gallery, Berlin; Maximilianeum, Munich, and in the museum at Danzig. He died in Berlin, April 3, 1884.

Richter, Johann Paul Friedrich, known by his pen-name of JEAN PAUL, a German humorist; born in Wunsiedel, North Bavaria, March 21, 1763. The imaginative boy was brought up in the idyllic sabbath-life of the mountain villages in which his father was pastor, went to school at the town of Hof, and in 1781 was sent Leipsic University to

study theology. But, like Lessing, he did not study theology; Rousseau and Voltaire, Swift and Sterne, Pope and Young, had much stronger attractions for him, and he too resolved to write books. He asserted his independence of custom by discarding the periwig and stiff necktie, wore his hair long, his shirt and vest open at the throat, and dressed himself as he pleased. But he found it harder work to get bread than to write and assert his position as an "emancipated" youth. Being poor, he got into debt all round, and in November, 1784, fled secretly from Leipsic to go and hide his head in the poverty-stricken home of his mother (a penniless widow since 1779) at Hof. His first literary "children" were satires; but he could get no publisher to introduce them to the world, till in 1783 Voss of Berlin gave him 40 louis d'or for "The Greenland Law-suits." The book was a failure.

For three years Jean Paul struggled on at home, his mother spinning hard for bread, he helping with the few florins he earned by his pen.



JEAN PAUL RICHTER..

He read enormously, omnivorously, and sat hours making excerpts from the books he devoured—a practice he kept up from early boyhood to old age. These many folios of closely-written pages were the storehouses on which he drew for materials when he came to write

his romances. He took long rambles among the hills and forests, his hair flying in the wind, a book in his hand or a song on his lips, and a favorite dog at his heels. In the beginning of 1787 he began to teach the children of different families in the district, and of course taught by original methods. All this time he still went on writing, and during his nine years of tutorship produced among other things, the satirical "Extracts from the Devil's Papers" (1789), "Fälbel's Journey" (1796), and "Freudel's Complaint" (1796), the last two among the best examples of his satirico-humorous writings; the beautiful idylls "Dominie Wuz" (1793), "Quintus Fixlein" (1796; Eng. trans. by Carlyle, 1827), the "Parson's Jubilee" (1797), the first two perhaps the most finished things Jean Paul ever wrote; the grand romances "The Invisible Lodge" (1793), "Hesperus" (1795; Eng. trans. 1865), and "Flower, Fruit, and Thorn Pieces," or "Siebenkäs" (1796-1797; Eng. trans. by Noel 1844 and 1871, by Ew-

ing 1877); "Companerthal" (1797; Eng. trans. 1857), a series of reflections on the immortality of the soul, an undigestible book; and the prose lyrical idyll, "My Prospective Autobiography" (1799). "The Invisible Lodge" was his first literary success; "Hesperus" made him famous. In 1796 Charlotte von Kalb, perhaps the most remarkable, certainly the most advanced woman of her age in Germany, wrote to express her admiration of the book; and a few months later, at her invitation, Jean Paul visited Weimar. There Goethe received him politely, but with cool reserve; that, too, was Schiller's attitude, when Jean Paul went on to Jena to see him. The antagonism between them was deep and fundamental, and lasted till death, being at times but ill concealed by all three. Herder and his wife, on the other hand, greeted the young romance-writer with overflowing admiration, and gave him their friendship, which also endured till death. As for Charlotte von Kalb, she did not stop at friendship: in spite of having a husband already, she exercised her sex's fabled privilege of leap-year—her first letter to him was dated Feb. 29—and gave him unmasked the love of her vehement heart.

From this time for a few years Jean Paul's life was rich in incident and full of excitement—an Odyssey of love adventures, in which he was the object of extravagant idolatry on the part of the women of Germany, especially of aristocratic dames who dabbled in literature. They gave him their love whether or no, and would have deserted husband and children for his sake; for, though not personally handsome, Jean Paul had a wonderful fascination of manner, particularly toward women. He found all women charming, he was a delightful talker and a good listener, and had a sweet and sympathetic smile—qualities that explain a good deal. In 1801 he married a Berlin lady, and three years later settled down at Bayreuth, attracted by its beauties of hill and valley, and by its beer. There he spent the rest of his days, leading a simple, busy life, writing his books, playing with his children, tending his pet animals, and taking short summer journeys to different towns of Germany; the present of a flower filled him with perfect joy. His last years were clouded by the death of his only son, a promising student, in 1821, and by his own blindness. From 1799 he enjoyed a pension from the Prince-primate Dalberg, and then from the King of Bavaria. He died Nov. 14, 1825.

The principal works of his married life were the two grand romances, "Titan" (1800-1803; Eng. trans. 1862) and "Wild Oats" (1804-1805; Eng. trans. as "Walt and Vult," 1849), the former accounted by himself and by most German critics his

master-piece, though Englishmen would generally prefer the latter, as they would certainly prefer "Siebenkäs" to "Hesperus"; "Schmeltzle's Journey to Flätz" (1809; Eng. trans. by Carlyle, 1827) and "Dr. Katzenberger's Trip to the Spa" (1809), the best two of his satirico-humorous writings; the idyll "Fibel's Life" (1812); the fragment of another grand romance, "Nicholas Markgraf, or The Comet" (1820-1822); a series of reflections on "Literature" ("Vorschule der Ästhetik"; improved ed. 1812), containing many excellent things about poetry, humor, wit, style; another series on "Education" ("Levana," 1807; Eng. trans. 1848, 1876, and 1887), a book that ranks with Rousseau's "Emile" as a standard work on training the young, and is full of ever-green wisdom; various patriotic writings (1808-1812); and an unfinished "Autobiography" (1826), the finest of all his idylls.

Jean Paul stands apart entirely by himself in German literature, a humorist of the first water, a Titan, "a colossal spirit, a lofty and original thinker, a genuine poet [in prose], a high-minded, true, and most amiable man. . . . He advances not with one faculty, but with a whole mind, with intellect, and pathos; and wit, and humor, and imagination, moving onward like a mighty host, motley, ponderous, irregular, irresistible. He is not airy, sparkling, and precise, but deep, billowy, and vast" (Carlyle). Two irreconcilable tendencies strive for mastery in him and his works—a dreamy, lachrymose sentimentality, that shrank from the rough buffetings of life, and sought refuge in emotional dissipation, luxuriating in tears, caressing sorrow, coquetting with love, melting in melancholy, longings for the world beyond the grave; and a sharp-eyed, wide-awake common sense that saw workaday realities with the utmost clearness and discrimination. All his great qualities of imagination and intellect were, however, made ministers to his humor, which had the widest range, moving from the petty follies of individual men and the absurdities of social custom up to the paradoxes that are rooted in the permanent ordinances of the universe. He turns his irony—a tender, reverent, playful irony—on all the relations of human life, even on the holiest beliefs of his own heart. And, in spite of the egotism of genius that often shows itself so strongly in him Jean Paul had the heart of a truly great and good man. Börne calls him the author *par excellence* of the lowly born, the poverty-stricken, the neglected, and the despised; to this class belong some of his finest characters, as Wuz, Fixlein, Siebenkäs, Vult.

As a master of pathos he is put by De Quincey above Sterne. Few, if any, have written with such tender love and such deli-

cate feeling of the idyllic joys of the country and the happiness of simple domestic life, particularly in the schoolhouse and parsonage. He had a wonderfully deep and sympathetic insight into the nature of woman, but has not created more than one lifelike woman (Lenette). Yet the male characters of his books, in so far as they are humorous are generally living beings, or else, if secondary characters, well-drawn pencil sketches in outline. Jean Paul is the classic author of friendships (Siebenkäs and Leibgeber, Walt and Vult); he matched them with his own friendship for Hermann and Oertel, and for Otto and the Jew Emmanuel Osmund. Nature was to him a living and divine presence: he loved her reverently, from the solemn stars to the tiniest flower, and his descriptions of nature embrace some of the loftiest hymns the spirit of man has chanted to the beauty and sublimity of created things—*e. g.*, several passages in "Hesperus" and "Wild Oats," the "Dream of the Universe" in "Siebenkäs." God and the immortality of the soul were the great facts ever present to his mind, influencing all his thoughts. An enduring sense of the ethic worth of human action, "a noble reverence for the spirit of all goodness forms the crown and glory of his culture" (Carlyle).

The reason why he is so little known, except by name, is that of all great writers he is one of the most difficult to read, and it may be added to understand. No reader who has not the strongest constitution can struggle through the tangled thickets of encyclopædic learning, the tortuous wit, the dreary wastes of digression and dullness, the hothouses of tropical sentimentality, amid which the gem-like gardens of his creative art are hidden. His prose is harder to translate than Heine's verse. For literary form, for order, harmony, or restraint he has not the slightest respect. The principal idea in his (often) long sentences is too frequently lost amid a labyrinth of subordinate clauses. The story is chiefly a peg for Jean Paul to hang Jean Paul's self-communings and reflections upon, a *point d'appui* for the play of his wit and humor. The wildest improbabilities, the wildest extravagances of fancy, are indulged in without check. Sentence follows sentence teeming with allusions, analogies, images, metaphors, similes, tumbling one over another in inextricable confusion. A Cræsus of idioms, he is the greatest and most prolific word-coiner in the language: he compels words to adapt themselves to his ideas. Often enough his diction is inflated and bombastic, and his literary taste execrable; yet when he is at his best his language marches with a majesty, a dignity, a natural beauty that are seldom matched in German literature. Car-

Richthofen

lyle's "Sartor Resartus" and "French Revolution" are steeped in the spirit of Jean Paul, and show how greatly he fascinated the imagination of the rugged Scotchman.

Richthofen, Ferdinand Baron von, a German geographer; born in Karlsruhe, Silesia, May 5, 1833; was educated at Breslau and Berlin universities, and at the Geological Institute of Vienna (1856); and in 1860 accompanied a Prussian expedition to Eastern Asia. The next 12 years he spent in traveling through Java, Siam, Burma, California, Sierra Nevada, and China and Japan (1868-1872). After his return to Europe (1872) he was appointed president of the Berlin Geographical Society (1873-1878), Professor of Geology at Bonn (1875), and of Geography at Leipsic (1883) and at Berlin (1886). His reputation as a geographer is built principally upon his great work on "China" (Berlin 4 vols. 1877-1881), and upon "The Metallic Production of California" (1865), "The Natural System of Volcanic Rocks" (San Francisco, 1867), "Exercises and Methods of Modern Geography" (1883), and numerous articles in geographical journals. He died in 1888.

Ricimer, a general of barbarian descent who ruled the W. Roman empire by emperors whom he set up and put down at will. He dethroned Avitus in 456, and appointed Majorianus emperor, whom he caused to be assassinated in 461. He then placed Livius Severus on the throne, and on his death in 465 he carried on the government for some time alone. In 467 Anthemius was put on the throne, and gave his daughter in marriage to Ricimer. The latter soon took up arms against his father-in-law, who was assassinated in 472. Ricimer died soon after.

Ricinelaïdic Acid, $C_{18}H_{34}O_3$; palmitic acid; produced by the action of nitrous acid on ricinoleic acid, or by saponifying ricinelaïdin with caustic potash, and decomposing the resulting soap with hydrochloric acid. It crystallizes in white silky needles melting at 50° , is insoluble in water, soluble in alcohol and ether, decomposing alkaline carbonates. The ricinelaïdates of the alkali metals are readily soluble in water; the other salts are very insoluble.

Ricinus, a genus of plants, order *Euphorbiaceæ*. *R. communis* is the palma christi or castor-oil plant, a native of the East and West Indies and Florida. Castor oil is obtained from the seeds, either by expression with or without the aid of heat, or by decoction, or sometimes by the aid of alcohol. Castor seeds, when taken whole, are extremely acrid, and have produced death; but the expressed oil is a mild and most efficient nonirritating laxative. Its valuable properties are principally owing to the presence of an acrid resin.

Rickman

The so called concentrated castor oil, which is sold in gelatine capsules, is adulterated with croton oil, and hence may produce serious effects when administered in certain cases. The palma christi has been cultivated in Algeria for the purpose of feeding silk worms on the leaves.

Rickets, a disease peculiar to infancy, chiefly characterized by changes in the texture, chemical composition, and outward form of the bony skeleton, and by altered functions of the other organs, transient for the most part, but occasionally permanent. The chief external features are the legs bent outward, chest unduly projecting, head large and forehead projecting, spine often curved, joints large and prominent, general form stunted, etc. Rickets is chiefly a disease of large cities, and its development is favored by want of nourishing food, overcrowding, and neglect of sanitary and hygienic precautions generally. In the treatment of rickets all means are employed by which the system is invigorated, including good food, fresh air, and exercise. The use of splints for the legs is often beneficial, and as the child grows up nature often remedies the worst features.

Ricketts, James Brewerton, an American military officer; born in New York city, June 21, 1817; was graduated at the United States military academy, in 1839; was a captain in the regular army in 1852; and gained a record for excellent service during the Mexican War. In 1861 he was appointed a Brigadier-General of volunteers, and commanded a division at the battle of Antietam, in September, 1862. He was in the thick of the battle of the Wilderness, May 5 and 6, 1864; was severely wounded at the battle of Cedar Creek, Oct. 19, 1864; and was brevetted Major-General, U. S. A., in 1865. He served in the Army of the Potomac from the first battle of Bull Run till Petersburg was besieged in 1864. He died in Washington, D. C., Sept. 22, 1887.

Rickman, Thomas, an English architect; born in Maidenhead, Berkshire, in 1776; was undecided as to a calling, being in succession chemist, grocer, corn-factor, and insurance agent; but seems to have always had a love for architecture, and to have studied it carefully. Having sent in a design for a church that proved successful in a government competition, he settled at Birmingham as an architect. He designed a great number of Gothic churches and chapels—*e. g.*, in Birmingham, Hampton Lucy, Bristol, Preston, Carlisle, etc., many country-houses, and the new buildings of St. John's College, Cambridge. He died in March, 1841. His "Attempt to Discriminate the Styles of Architecture in England from the Conquest to the Reformation" (1817;

Ricnia

6th ed. by J. H. Parker, 1862) is still a standard authority.

Ricnia. See RATHLIN.

Ricochet Fire, a mode of firing with small charges and small elevation, resulting in a bounding or skipping of the projectile. In firing at a fortification, sufficient elevation is given to just clear the parapet, so that the ball may bound along the terreplein or banquette without rising far above its level. It is used with effect on hard, smooth ground against bodies of troops or such obstacles as abattis; and also on water, either with round shot or rifle balls. It was introduced by Vauban at the siege of Philipsburg, in 1688.

Ricord, Philippe, a French physician; born in Baltimore, Md., Dec. 10, 1800; went to Paris in 1820. He was almost immediately admitted as an *interne*; was attached successively to the Hôtel Dieu, under Dupuytren, and to La Pitié under Lefranc, and was appointed, in 1831, surgeon-in-chief to the Hôpital des Vénériens of the South which position he held till October, 1860, when he retired. This appointment secured Ricord the special reputation which he enjoys for his knowledge and treatment of that class of diseases to which it relates. Ricord discovered a cure for varicocele, etc., for which he received, in 1842, the Monthyon prize. He became a member of the Imperial Academy (section of Surgical Pathology) in 1850 and attached, as consulting-surgeon, to the Dispensary of Public Health. By decree, July 28, 1862, he was appointed physician-in-ordinary to Prince Napoleon. He was promoted to the rank of Commander of the Legion of Honor Aug. 12, 1860, and was decorated with numerous foreign orders. Among his various works are: "Use of the Speculum"; "Use of Mercurial Ointment in the Treatment of Erysipelas"; "Monography of Cancer"; "Treatment of Venereal Diseases," etc. He died in Paris, Oct. 22, 1889.

Riddell, Charlotte Eliza Lowson (Mrs. J. H.), an English novelist; born Sept. 30, 1832. She published several of her early novels under the name of "F. G. Trafford." Her many books include: "George Geith" (1864); "The Race for Wealth" (1866); "Far Above Rubies" (1867); "Austin Friars" (1870); "The Ruling Passion" (1876); "The Senior Partner" (1881); "The Struggle for Fame" (1883); "Miss Gascoigne" (1887); and "Idle Tales" (1888); "A Mad Tour" (1887); "A Silent Tragedy" (1893); "A Rich Man's Daughter" (1879), etc.

Ridderstad, Karl Fredrik (rid'er-städ), a Swedish novelist; born in Södermannland, Sweden, in 1807; was a member of the Riksdag, and famous for his eloquence and pa-

Riddles

triotism. He is the author of several historical romances, the best of which are "The Halberdier" and "The Prince"; a number of novels in imitation of Eugène Sue, including "Mysteries of Stockholm" and "The Black Hand"; and many lyrics, in which line he was most successful. He died in 1886.

Riddles, or Sense-riddles, to adopt Dr. Tylor's phrase, have been defined as "round-about definitions of the hearer has to guess what." They were widely popular in dim antiquity, as today they are popular among many half-civilized races—not absolute savages, for to perceive an analogy demands some measure of culture. They may be broadly divided into two classes—riddles admitting of more or less easy solution, and riddles whose solution is beyond any wit of man, unless indeed, as is very often the case, the answer is known already. To the former class belong the enigma propounded by the Sphinx to Œdipus, and that which, according to Plutarch, Homer died of chagrin at not being able to answer. It seems to us easy now, for it was the one about the two boys who went hunting: all they caught they flung away, and all they could not catch they carried home. Of insoluble riddles Samson's is a good instance, and this which, in a Russian folk-tale, is put by "Boots" to the princess: "As I came to you I saw on the way what was bad, and I struck the bad with a bad thing, and of what was bad the bad died." Naturally the princess could not guess that he had killed a snake with his lance; she gave it up and had to marry him. Such propounding of riddles for wagers (her hand to his head in this instance) meets us frequently. Josephus relates how Solomon and Hiram, King of Tyre, once had a contest, in which Solomon first won a large sum of money from Hiram, but presently lost it all back to Hiram's subject Abedemon. The Queen of Sheba, again, came to pose the wise king with enigmas (*"venit tentare eum ænigmatibus,"* so it runs in the Vulgate); the trials of skill between Vergil's shepherds are a standard classical instance; and, to come down to later times, the Russian folk tale has many analogues in other folk-lore.

The riddle is found in the Koran, and several collections of riddles exist in Arabic and Persian. They were, it seems, also known to the ancient Egyptians, while among the Greeks they were allied in the earliest times with the oracular responses, and, like Sampson's riddle, were generally in poetical form. But in Greece they first came into vogue about the time of the "Seven Sages," one of whom, Cleobulus, was celebrated for the composition of metrical *griphoi*. Even the greater poets did not disdain to introduce them into their writ-

Rideau Canal

ings or to devote whole poems to the subject—*e. g.*, the “Syrinx,” commonly ascribed to Theocritus. Appuleius wrote a “Book of Jokes and Riddles,” but it is lost; and almost the only name we can fix on is a certain Cælius Firminanus Symposius, whose riddles, comprising 100 hexameter triplets, are termed by St. Aldhelm “rubbish.”

The riddle was much cultivated during the Middle Ages. Many French, English, and German riddle-books exist in MS., and some were printed at an early period. Wynkyn de Worde’s “Joyous Questions” (1511) contains several riddles that are simply coarse jests; but others, again, well illustrate the simple faith of mediæval Christendom—*e. g.*, “Demand: What bare the best burden that ever was borne? Response: The ass that carried our Lady when she fled with our Lord into Egypt.” The Reformation checked, if it did not wholly stop, the merry pastime of riddle-making; but in France, in the 17th century, it began to creep back into favor, till at last riddles rivalled in popularity the madrigals and sonnets of the period. Le Père Menestrier, in 1694, wrote a grave treatise on the subject; and before that, in 1646, the Abbé Cotin had published a *recueil*, in the preface to which he modestly dubbed himself “the Father of Enigma.” “Posterity,” adds a French critic, “has not recognized his paternity.” The taste for riddle-making grew and grew, and many brilliant French writers, such as Boileau, Voltaire, Madame du Deffand, and Rousseau, did a little in this line, till finally the “Mercury of France” became a fortnightly repository of riddles, the solution of which secured a reputation in society. In Germany we have Schiller’s delightful extravaganza “Turandot,” and in England Cowper, Fox, Canning, and Praed are a few of the makers of poetical riddles or charades. Today with us the riddle is a mere *jeu d’esprit*, a conundrum or pun couched question-wise; but among the Irish, German, and Russian peasantry, the gipsies, the Zulus, the Samoans, and many more races, the old-fashioned sense-riddles, often enshrining a mythological germ, still hold their own. Thus, “in the government of Pskov, on the occasion of a marriage, the bridegroom and his friends are not allowed to enter the bride’s cottage till they have answered all the riddles her friends put to them; and in one of the villages in the Jaroslav government a bargain of which the bride is subject is concluded between the groomsmen and the ‘seller of the bride’—riddles, answered by gestures, instead of words, taking the place of coin.”

Rideau (ri-dō') **Canal**, a Canadian canal constructed between Kingston on Lake On-

Riding

tario and Ottawa as a through waterway by means of the river Ottawa to Montreal, the St. Lawrence route being interrupted by rapids. Canals have since been built along the St. Lawrence to avoid these, and the Rideau is now little used.

Rideing, William Henry, an American author; born in Liverpool, England, Feb. 17, 1853. His books include: “Pacific Railways Illustrated” (1878); “A-Saddle in the Wild West” (1879); “Stray Moments with Thackeray” (1880); “Boys in the Mountains” (1882); “A Little Upstart” (1885); “The Boyhood of Living Authors” (1887); “In the Land of Lorna Doone”; “The Captured Cunarder”; “At Hawarden with Mr. Gladstone,” etc. In 1881 he became associate editor of the “Youths’ Companion.”

Riders, additional provisions of a bill under the consideration of a legislative assembly, having little connection with the subject-matter of the bill. They are usually without enough specific merit in themselves to ensure their adoption in any other way. Sometimes riders are attached to important bills, in order to gain the chance of passage, since by themselves they are likely to incur an executive veto, but as a part or proviso of an important bill they are absorbed in the main subject, and so dodge the “veto” and the “table.” Appropriation bills are more than others “saddled with riders.” The consequence of this custom is, practically, a limitation of the veto power of the executive. It has been proposed frequently that the Constitution of the United States be so amended that the President could veto single objectionable items, without affecting the main purpose of bills.

Ridgway, Robert, an American naturalist; born in Mt. Carmel, Ill., July 2, 1850. He early turned his attention to natural history and was zoölogist to the United States geological expedition under Clarence King in the Western States in 1867–1869. He was one of the founders of the American Ornithologists’ Union, of which he became president, and was a member of the committee of the first International Ornithological Congress at Vienna, in 1885, and of the second in Budapest in 1891. His publications include “The Ornithology of Illinois” “A Manual of North American Birds”; “A History of North American Birds,” etc.

Riding, the art of sitting on horseback with firmness, ease, and gracefulness, and of guiding the horse and keeping him under perfect command. The art of riding may be divided into (1) ordinary riding, (2) school riding, (3) circus riding, and (4) side-saddle riding. The two objects aimed at in ordinary riding (which includes riding on the road, hunting, pig-sticking, stock-driving, breaking in young and freshly handled horses, playing polo,

race and steeplechase riding) are to remain in the saddle and to make the animal carry its rider with the greatest possible ease to itself. The former of these objects is the one almost entirely aimed at by the breaker when giving his first lessons; the latter, by the flat-race jockey. Hence we find that the saddle and seat adopted by the Colonial buckjumping rider are those that are best suited for "sticking on." The large pads on the flaps of his saddle are about six inches deep, and are curved backward, so as to fit against his thighs, a little above the knees, in a manner similar to that in which the third crutch (or leaping head) acts on the lady's left leg in a side-saddle. The seat of the jockey, instead of being that in which most security can be obtained, is the one by which the rider can best conform to the movements of his mount. Hence we find that, even in Australia, many of the best jockeys on the flat are but very poor performers on a buckjumper.

In all kinds of riding, balance rather than grip should be the chief means for retaining one's seat in the saddle, for if muscular action be constantly employed to "stick on" the muscles then brought into play will soon become tired, and will be unable to act at the very moment their aid is most required. One valuable rule in riding is that, except when applying the leg to the animal's side, the leg from the knee down should remain unaltered in its position, so that neither knee nor foot will work backward or forward. The movements of the upper part of the body should be regulated by the play of the hips. There should be no hollowing out of the small of the back or pushing out of the chest, or any other action which would give rigidity to the muscles. The great reason why any approach to stiffness, when riding, should be avoided is that it has to be maintained by muscular effort and is consequently followed by fatigue. As soon as the muscles become tired they are weak and slow to act. Consequently, if they be kept stiff (or, more correctly speaking, in a contracted condition) they will be unable to do any work they may be called upon to perform in as effective a manner as they would do were they kept lissom. Hence a person should ride, as a rule, by balance and not by grip, till the moment comes to put forth the required muscular effort.

The rider should endeavor to avoid the two very common faults of holding on by the reins and of putting too much weight on the stirrups, and he should try to ride with his seat well under him and not stuck out behind. If he find that he is insecure in his saddle he should allow no false shame to prevent him from getting

one in which he will have a firmer hold. To give this additional grip the saddle may be covered with buckskin, or with leather the rough side of which is put on the outside. The saddle should be roomy. The back part, on which the seat rests, should be fairly flat; the seat ought to have a good "dip" in it; and there should be tolerably large "rolls" on the flaps. To become a good rider one will require plenty of practice, and a frequent change of horse and saddle. The English style of riding, which has been adopted with much success in the hunting field, racecourse, steeplechase course, and polo ground, is treated clearly and systematically in Captain Hayes's "Riding" (3d ed. Lond. 1891). There is also much valuable advice given in Colonel Greenwood's "Hints on Horsemanship" (London). In the Badminton Library book on "Riding" (Longmans, Green, & Co.) this subject is treated from old-fashioned riding-school point of view, at which we shall presently glance.

In school riding the object of getting the horse to carry his rider with the greatest possible ease to himself, which is the chief aim of the ordinary rider, is sacrificed to a great extent for increased control, so as to get the horse to perform the various *airs de manège* with precision. The English military riding system is a kind of compromise between that of the continental *haute école* and the English hunting style. Though great improvements have been made in high school riding in France and Germany, the riding instruction contained in "The Cavalry Regulations" has remained practically unaltered for the past 30 years. M. Baucher, we may remark, was the great master of school equitation of the previous generation. His system has been much modified for the better by Captain Raabe and M. Fillis, though these masters differ in some details from each other. M. Barroil's "Art Équestre" (Paris) is molded on the teaching of Raabe. "Principes de Dressage and d'Équitation" (Paris), by M. Fillis, contains all his views. Both are most valuable works and should be carefully studied by the student. Previous to their appearance Mr. E. L. Anderson wrote "Modern Horsemanship" on the same subject; but it is neither so elaborate nor so instructive as either of the other two, which ought to be read conjointly.

Though exhibitions of school riding are often given in a circus, we must separate it from circus riding, which, properly speaking, is limited to performances (standing, leaping, dancing, and tumbling) in an upright position, either on a pad or on the bare back of a horse. The only part which we could term riding, in the usual sense of the term, is the "bounding jockey act," in which the performer, while riding round

the ring, takes off his saddle, stands on it, gets off his horse, and jumps astride on him and on top of his back while the animal is galloping round.

In side-saddle riding the lady depends for security of seat on balance and on the grip she has on the upper and lower crutches. Her right leg is placed over the former, and she presses her left leg, a little above the knee, against the latter when she seeks their aid. Her left foot should not be placed "home" in the stirrup, but only as far as the ball of the foot; and the heel should be slightly depressed. If, when her left leg is held in this manner, she can just feel the pressure of the lower crutch, the length of her stirrup will be about right. The only pace at which she should put weight on the stirrup is the trot. The great requisite for obtaining a "square" seat, which is the one correct position for a lady on horseback, is for the rider to put her weight on her right leg, and not equally on both, as is often wrongly advised, and to bring the left shoulder up as much as the right. The body should be free from all stiffness, and should be kept erect by the play of the hip-joints, and not by hollowing out the small of the back and pushing out the chest. She should try to get her seat well under her.

Riding-bitts, in shipbuilding, two strong upright timbers near the bows of a ship, to which the cable is secured; they extend through two decks, are connected by a cross-piece, and braced against the strain of the cable by horizontal standards bolted to the deck beams.

Ridley, Nicholas, an English clergyman, Bishop of London in the reigns of Edward VI. and his successor Mary; born about the commencement of the 16th century, and was educated at Cambridge. He afterward traveled on the Continent for three years, and on his return filled the office of proctor to Cambridge University. In 1547 he was chosen to the see of Rochester, and in 1550 superseded Bonner as Bishop of London. On the death of Edward he was involved in an attempt to secure the Protestant ascendancy by placing the Lady Jane Grey on the throne. This, together with his connection with Cranmer, led to his being tried for heresy, and after a formal disputation on the controverted points with a deputation to the stake. This sentence he underwent with the greatest fortitude, in company with his friend and fellow-sufferer Latimer, Oct. 16, 1555, in Oxford.

Ridpath, John Clark, an American educator; born in Putnam co., Ind., April 26, 1840; was graduated at Indiana Asbury University in 1863; and later held a professorship in Baker University, Kansas. In 1869 he became Professor of English

Literature at Asbury University, Indiana, and was elected its vice-president in 1879. Through his influence the endowment of nearly \$2,000,000 was bestowed on the university by Mr. DePauw, whose name it now bears. In 1874-1875 he published a "History of the United States" which he supplemented with another in 1877. In 1876 he issued a "School History," and in 1879 an "English Grammar." Desiring to devote his whole time to literature, he resigned his university offices. In 1881, he published the "Life of Garfield," a "Life of J. G. Blaine" in 1848, a "Cyclopædia of History" in 1880-1884, a "History of Texas" in 1884, "Great Races of Mankind in 1894," "Life and Times of Gladstone" (1898), and "A History of the United States" (8 vols. 1900). He died in New York city, Aug. 1, 1900.

Riehl, Wilhelm Heinrich, a German historian; born in Biebrich on the Rhine, May 6, 1823. He was the author of a number of excellent historical and ethnological works, and of a number of novels based on his studies in these directions. The most prominent of his works are: "Natural History of the People as the Foundation of the National Policy" (1851-1869); "Die Pfälzer" (1857); "Studies of the Civilization of Three Centuries" (1859); "Enigmas of Life" (1888); and "From the Corner" (1890). He died Nov. 16, 1897.

Riel, Louis, a Canadian insurgent, son of the half-breed leader of the Metis Indians who rebelled against Canadian authority; born in Boniface, Oct. 23, 1844. He was secretary of the Metis national organization, and later the president of their provisional government at Fort Garry in the Northwestern Territory. He led the Metis' Red River rebellion in 1869, which was subdued by a Canadian force under General Wolsely. He fled from the territory to escape arrest, and returned after peace terms had been arranged. He was elected to the Dominion Parliament in 1873, but was not allowed to take his seat. Again he incited rebellion, but it assumed only small proportions and was subdued by the Canadian government. His attempt to create resistance in 1885 was more successful, but the rebellion was overthrown by General Middleton's forces. Riel was captured, tried for treason, and was sentenced to death. It was generally believed by French Canadians that Riel was insane. He was executed, Nov. 16, 1885, at Regina in the Northwestern Territory.

Riemer, Friedrich Wilhelm, a German littérateur; born in Glatz, Silesia, April 19, 1774. The most important of his publications is a "Greek-German Dictionary-Manual" (1802-1804). His close association with Goethe in Weimar, where he

Rienzi

was for some time the instructor of Goethe's son gave him a poetic bent, and he published "Leaves and Flowers" (1816), under the pseudonym of "Sylvio Romano"; and under his own name, "Poems" (1826). He also brought out "Correspondence between Goethe and Zelter" (1833). He died in Wiemar, Dec. 19, 1845.

Rienzi (re-ain'dza), **Nicola Gabrini**, a Roman patriot; born about 1310. He was of obscure birth; but having received an excellent education, which he improved by a strong will and vigorous understanding, he was sent by his fellow citizens to Clement VI., at Avignon, in order to prevail on that pontiff to return to Rome. His eloquence pleased the Pope, though it did not persuade him; and Rienzi on his return formed the design of making himself master of Rome, with the title of tribune. Having gained a considerable number of partisans, he entered the capitol, harangued the people, and elevated the standard of liberty. He designed to unite the whole of Italy into one great republic, with Rome for its capital. For some time he was successful, his government was popular, and even Petrarch wrote in his favor, comparing him to Brutus. But at length a conspiracy was formed against him; and having lost

Rifle

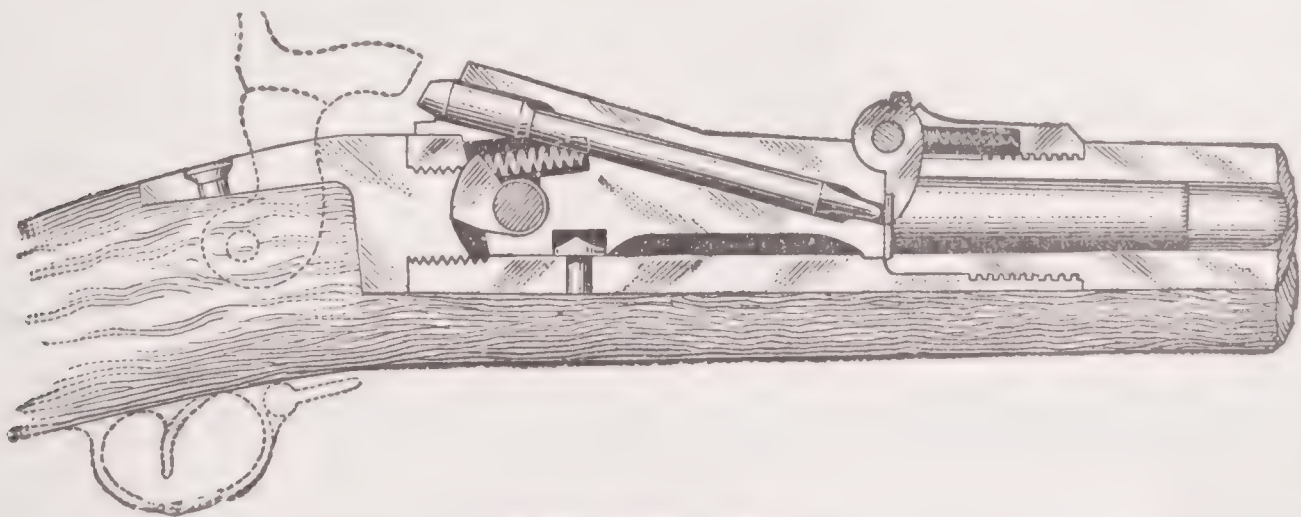
four feet in length, and nearly three feet high at shoulder. Horns round, annulated at base. General color dull ashy-gray, some-



NICOLA RIENZI.

times tinged with red on the upper parts; silver-gray on under surface.

Riff, a name given to the coast districts of Northern Morocco extending from Ceuta



SPRINGFIELD RIFLE.

the popular favor by his arrogance and tyranny, he was compelled to seek safety in flight, but was taken and cruelly put to death in 1352.

Riesengebirge, or Giants' Mountains, a mountain range of Europe, separating Silesia from Bohemia and Moravia, till it joins the Carpathians; but the name is properly applied to that part of this range which lies between the sources of the Neisse and the Bober. It contains the loftiest mountains of the N. or central parts of Germany, the Schneekoppe being 5,257 feet high. The geological structure of the range consists of granite, gneiss and mica slate, and in the valleys there are coal and basaltic strata.

Rietbok, in zoölogy, *Antilope arundinaceus*, from South Africa. Rather more than

to the W. frontier of Algiers, and forming a line of steep cliffs with few harbors. Its Berber inhabitants were formerly much addicted to savage piracy.

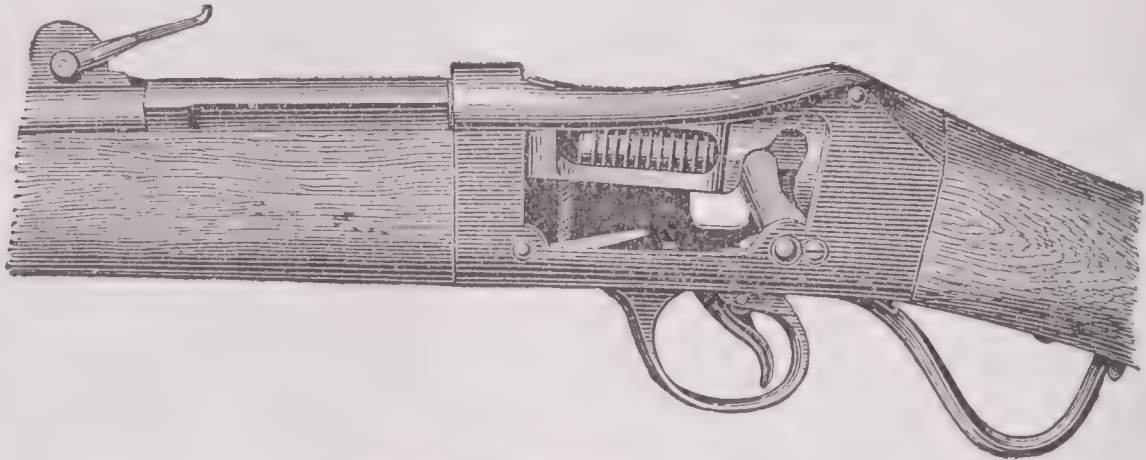
Rifle, a portable firearm, the interior surface of the barrel of which is grooved, the channels being cut in the form of a screw. The number of these spiral channels or threads, as well as their depth, varies in different rifles, the most approved form being with the channels and ridges of equal breadth, and the spiral turning more quickly as it nears the muzzle. The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet discharged from the piece, by having a rotatory action imparted to its axis coincident with its line of flight, is preserved in its

Rifle

direct path without being subject to the aberrations that injure precision of aim in firing with unrifled arms. As a necessary consequence of the projectile being carried more directly in its line of aim, its length

Rifle

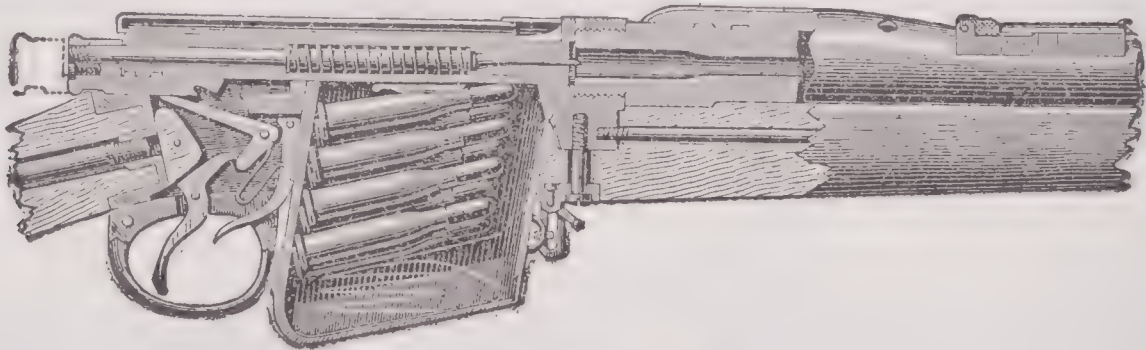
their arms had a grooved bore, but the grooves were straight. Not many years after, in 1520, Augustin Kutter (or Koster) of Nuremberg was celebrated for his rose or star-grooved barrels, in which the



HENRY MARTINI RIFLE.

of range, as well as its certainty in hitting the object is materially increased. Sporting rifles have a shorter range and inferior velocity to the best military weapons, their object being not extreme range or penetra-

tion, but great force at impact to produce such a shock as will paralyze the animal shot. While the popular conception of a rifle is a firearm proper or a weapon discharged in

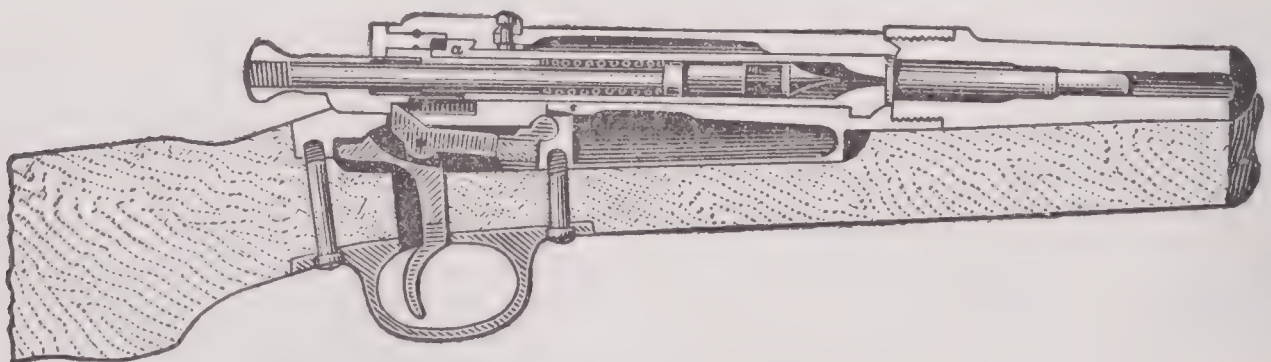


LEE-METFORD RIFLE.

tion, but great force at impact to produce such a shock as will paralyze the animal shot.

While the popular conception of a rifle is a firearm proper or a weapon discharged in

the barrels. The Revolutionary government of France had rifles issued to portions of their troops, but they met with so indifferent a success that Napoleon recalled them soon after he came to power. In the Penin-



UNITED STATES MAGAZINE RIFLE: KRAG-JORGENSEN.

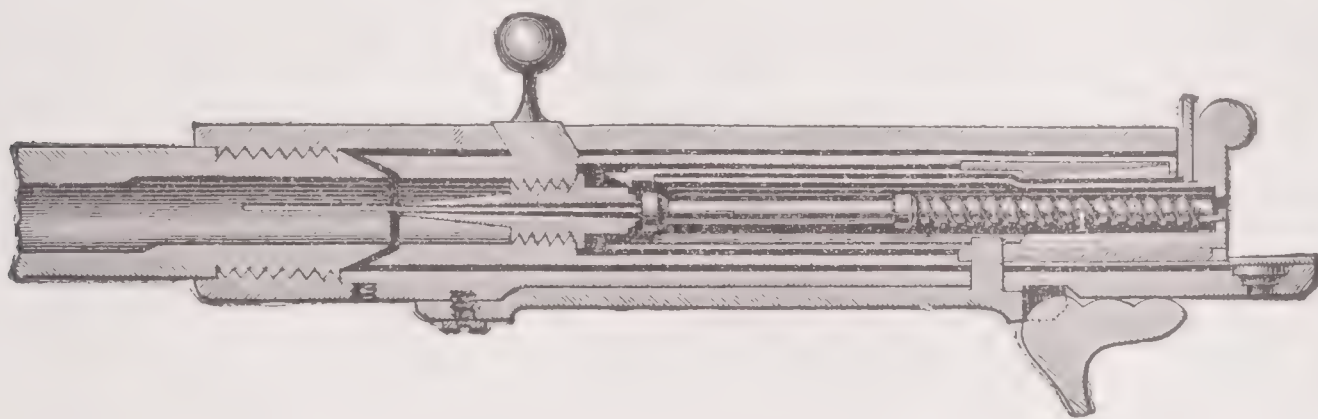
the hand, the word rifle has in recent years come to be applied as an abbreviation for rifled cannon of various ranges and calibers; as the 13-inch rifle carried by the "Oregon" in the fight with Cervera's fleet off Santiago, which was the largest piece of ordnance used in the American fleet.

As early as 1498 the citizen of Leipsic possessed the germ of the future rifle, for

sula, however, picked companies of sharpshooters practised with rifles with deadly effect on both the English and French sides. During the War of 1812-1814 the Americans demonstrated incontestably the value of rifles in warfare. It was soon discovered that a spherical ball was not the best missile; one in which the longer axis coincided with the axis of the gun flying truer.

The first war rifle was that of Captain Delvigne, proposed in 1826, and adopted for a few men in the French army. In 1842 Colonel Thouvenin invented a *carabine à tige*, in which the breech had a small pillar screwed into it, round which the powder lay, and on the end of which the bullet rested, its base being flattened out by the force of the ramrod. Colonel Delvigne added a conical bullet to this rifle, and the combined invention was issued to the *Chasseurs d'Afrique* in 1846. It was superseded-

Rifle Bird, the *Ptilorhis paradiseus*, often spoken of as one of the "Birds of Paradise"; is perhaps the best-known species of a genus which, according to Elliot, comprises four species confined to Australia and to New Guinea. *P. paradiseus* inhabits the S. E. districts of Australia, and is found only in very thick "bush." The male is regarded as more splendid in plumage than any other Australian bird. The upper parts are velvety black, tinged with purple; the under parts velvety black, diversi-

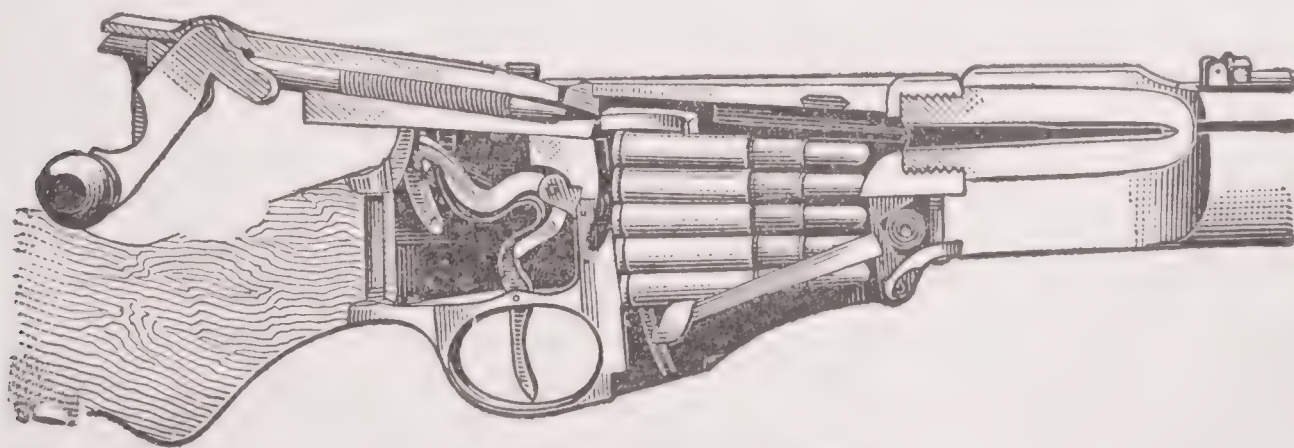


MECHANISM OF NEEDLE GUN.

ed by using with a grooved barrel the Minié bullet. The Prussians, meanwhile, had armed their troops with the needle rifle (*Zündnadelgewehr*), later superseded by the Drey and the Drey by the Mauser. Experiments were set on foot in all directions, and resulted in 1853 in the production of the Enfield rifle, which had three grooves, taking one complete turn in 78 inches, and fired a bullet resembling the Minié, except that a wooden cup was substituted for one of iron. From 1853 to 1865 this was the

fired with olive-green. The crown of the head and the throat are covered with innumerable little specks of emerald green of most brilliant luster. The tail is black, the two central feathers rich metallic green. The female, as is often the case, is much duller colored than her mate.

Riga, a city and capital of Livonia, and after St. Petersburg and Odessa the third seaport of Russia, on the Dwina river (crossed here by a bridge of boats and a railway bridge), 7 miles from the mouth



UNITED STATES NAVY RIFLE.

weapon of the British army. In 1865 the adoption of the breech loading arms caused the Enfield to be converted into a breech loader by fitting the Snider breech mechanism to the Enfield barrel. The Henry barrel was in 1871 adopted in conjunction with the Martini breech for the new small bore rifle for the British army, now known as the Martini-Henry rifle; later superseded by the Lee-Netford. For further details in reference to the rifles in use by the United States, see FIREARM.

of the river, and 350 S. W. of St. Petersburg, via Pskoff. The old town has narrow streets and mediæval houses and stores; but the suburbs are laid out in broad streets with handsome buildings. The chief edifices are the cathedral built in 1204, burned down in 1547, but rebuilt; St. Peter's Church (1406), with a steeple 460 feet high; the castle of the old Knights of the Sword, built 1494-1515, the former residence of the grand-master of the order; and several old guild houses and Hanseatic

Riga

halls. It is the seat of an archbishop of the Greek Church. Its industries are rapidly growing; they turn out cottons, machines, tobacco, corks, spirits, oils, metal wares, glass, paper, flax, jute, and oil-cloth, and employ nearly 12,000 people. Riga was founded in 1201 by Albert, Bishop of Livonia, and soon became a first-rate commercial town, and member of the Hanseatic League. It belonged to Poland from 1561, and in 1621 was taken by Gustavus Adolphus, and in 1710 was finally annexed to Russia. Pop. (1897) 256,197.

Riga, Gulf of, an inlet on the E. side of the Baltic Sea. It is 105 miles in length from N. to S. and about 60 in breadth. The islands of Oesel, Dagö, Mohn, and Worms, lie across the entrance. The chief river which falls into the gulf is the Dwina. Sandbanks render navigation in some parts dangerous.

Riggs, John Davis Seaton, an American educator; born in Washington, Pa., Jan. 29, 1851; was graduated at the University of Chicago in 1878; principal of the commercial department of Salt Lake Academy, Utah, in 1878-1879; and of the preparatory department of the old University of Chicago in 1879-1886; joint principal of the University Academy in Chicago in 1886-1887; organizer and principal of Granville (now Doane) Academy of Denison University in 1887-1896; and president of Ottawa University after 1896. He was a member of the Kansas State Board of Education; president of the Kansas College Presidents' Association; corresponding member of the Kansas State Historical Society; and author of numerous articles, lectures and addresses.

Riggs, Kate Douglas Wiggin, an American author; born in Philadelphia, Pa.; was graduated at Abbott Academy in 1878; organized the first free kindergarten for poor children on the Pacific coast, and continued interested in the work. She was the author of "The Birds' Christmas Carol" (1888); "The Story of Patsy" (1889); "The Village Watch Tower" (1895); "Kindergarten Principles and Practice" (with Nora A. Smith 1896); "Penelope's Progress" (1898); "Penelope's Experiences in Ireland" (1901); etc.

Riggs, Robert Baird, an American chemist; born in Hazelwood, Minn., May 22, 1855; was graduated at Beloit College, Wis., in 1876; Professor of Chemistry at the National College of Pharmacy in 1885-1887; and later became Professor of Chemistry at Trinity College, Hartford. He was for several years connected with the United States Geological Survey as chemist.

Right Arm of the Commonwealth, a descriptive term bestowed on the peninsula

Right-handed

of Cape Cod, Mass., because of its peculiar shape.

Right-handed, in human beings the propensity to use the right hand in preference to the left. This propensity is no doubt due to the lack of perfect symmetry in the human body. If the latter could be folded over from a medial line so that each organ of the one side fell exactly on a corresponding organ of the other, we should have a structure highly favorable, mechanically, to the equal use of each limb, and ambidextral individuals would be the rule, not the exception. If a vertical line be drawn dividing the body it will be found that the center of gravity is a little to the right of this medial line. This makes the right side heavier. From a series of experiments the greater weight has been estimated at about 15 ounces. On this fact is founded the mechanical theory of right-handedness, or the predominance of the right hand over the left; or, more generally, of the limbs of the right side over those of the left as expounded by Professor Buchanan of Glasgow in a pamphlet published in 1862. The three lobed right lung is more capacious and receives more air during an inspiration than the two lobed left. The liver during inspiration swings toward the right side shifting the center of gravity farther to that side. In violent muscular exertion there is more air proportionally inhaled by the lung of the side which sustains the exertion. Normally about 230 cubic inches of air are contained by the lungs, of which the right holds 20 inches more than the left. Under exertion of the right side the larger lung is better filled than the smaller, and the center of gravity is removed till it is found in a line passing through the right foot; so that the right leg and foot afford a steadier basis of support than the left would do under similar circumstances. Whichever leg we stand on we use the arm of that side to greater advantage, and thus, through the greater use of the right lower limb, the right upper limb comes to be preferred.

Professor Buchanan's theory also explains the almost universal habit of carrying burdens on the left shoulder. In the case of a light weight, slung on the arm, the equilibrium of the body is better maintained by carrying it on the left side. If the weight be a heavy one, borne on the left shoulder, the burden is really being supported very much by the right limb, owing to the natural curve of the body toward the right side, while sustaining the pressure.

But, it may be argued, if this theory covers the case, then left-handedness, which is certainly inherited, cannot be accounted for except on the extraordinary supposition of transference of the viscera. In a very few cases left-handedness has been found

to accompany such transposition. Strange to say the liver has been found on the left side, and the heart, stomach and spleen on the right without any derangement to the health of the subject, even from the point of view of a life insurance company. Nevertheless, the number of cases of genuine left-handedness far exceeds such instances of transposition. An explanation of left-handedness in normal structures has been sought by falling back on the fact that the cerebral hemispheres of the brain work the muscles crosswise. Ferrier's researches have proved that when we see with the right eye we see with the left side of the brain. Another curious and instructive fact is that, though an animal be rendered blind in one eye by the destruction of a convolution on one side of the brain, the blindness is temporary. Soon the other hemisphere can take up the function, and then vision is possible with both eyes, as it was before the injury occurred.

Viewed in this light, hereditary left-handedness may be due to the greater development of the right side of the brain. Suppose accident deprived a comparatively young archer of his right hand or right eye, then the left hand, governed by the right hemisphere, being called into work would react on that hemisphere, whose blood vessels would be oftener replenished and whose strength and sensitiveness would grow. It is not too much to assume that in some cases this improved power of the right hemisphere might be transmitted to a descendant. "It is practically certain," says Dr. Bastian, "that the great preponderance of right-handed movements in ordinary individuals must tend to produce a more complex organization of the left than the right hemisphere." M. Broca states that in 40 brains he examined he found the left frontal lobe heavier than the right. These investigations have not yet been thoroughly carried out; but possibly the explanation of obstinate left-handedness lies in that direction.

In connection with the evolution of the species right-handedness, in all probability, has been a late acquisition. The body is more symmetrical in early youth, and is more symmetrical in the female than in the male. A very young child betrays no disposition to use the right hand more than the left. The habit of using the right hand gradually increases with boyhood, and boys have to the last a wider range with the right hand than girls, who are proverbially bad throwers. Hitherto, however, the oldest records of the human race, even when man sketched with a flint point on the bones of extinct animals, prove him to have been a right-handed being. His profiles are then sketched with faces toward the left, just as a street arab chalks them on a door at

the present day. Nevertheless, the primeval left-handed artist often betrays himself. Bronze weapons are the weapons of right-handed individuals; witness the curious yew-tree handle of a bronze sickle fished up from the lake of Brienne, Switzerland, quite intact and ingeniously carved, "as incapable," says Sir Daniel Wilson, "of being used by a left-handed shearer as our present mower's scythe."

A few observers of the habits of savages have remarked that left-handed individuals were proportionally more numerous among them. This is what we should expect from the enormous additional demands made by civilization, its manners, and its tools on the activity of the right hand. It only requires to spend an hour at a carpenter's bench to see how planes, screws, etc., are fashioned to suit that member. In drawing a pattern of small repeating character we begin, as we begin to write a page, at the top left hand side, so as to avoid placing fingers on the still undried pigments. Military drill, associated labor, and, as much as any, the tyrant fashion, all urge on the right hand in the path of greater dexterity, leaving the left as the inept drudge whose duty it is merely to assist. No wonder the right has acquired strength, size, greater tactile sensibility, and greater patience of the extremes of heat and cold. Naturalists, who observe that adult monkeys catch nuts more with the right hand, that the African elephant digs more with the right tusk, or that the Carolina parrot has a preferential claw for grasping, tell us that these habits are subject to more numerous exceptions than the exception of left-handedness with human beings. Egyptian and Assyrian painting and sculpture and Etruscan bronzes also elucidate the general law that burdens have been assigned to the left shoulder; so that the position of the shepherd's plaid is no wise a whim, but has its roots in the far past. The primitive blanket-like toga of the Etruscans covers the left shoulder, and is wrapped under the right armpit to allow of the freer motion of that arm.

Right of Way, the right which the public has to the free passage over roads or tracks. The expression is more generally applied to those public routes which are not statutory roads, such as hill or field paths, drove roads, bridle and other paths, and cart or driving roads in the common use of the public, which are not kept up by the county authorities. In many instances these roads are the only means of communication between important districts; and generally they are the shorter, and often the more picturesque, ways from one point to another. Right of way also exists along the seashore and on the banks of tidal rivers. The law of rights of way is judicial and not

statutory. In Scotland, where of late the chief *causes célèbres* have originated, 40 years' continuous use by the public of such roads or paths is the prescriptive period for constituting a right of way; while in England the public acquire a right of way under dedication to them by the owner of the soil, and user signifying their acceptance of the same, or when dedication can fairly be assumed from notorious user, which needs generally to be proved for a lengthened period, but which may yet, according to circumstances, be presumed from a period of user of only a few years. The following points fall under the legal aspect of a public right of way, according to the law of Scotland: (1) The path or road must go from one public place to another public place. By this is not meant that it must go from one town or village to another; it may be between any two points at which the public have a right to be, and to which they resort for some definite and intelligible purpose. Thus it may run from one highway to another; but it cannot run between a public road and a private house. (2) It must be along some tolerably well-defined route between the termini. (3) If there is a definite road between two public places it does not matter for what purpose it is used. It is not necessary that the public should use the road for any business purposes; it is quite sufficient if the purpose is merely for recreation, the exercise of walking, or the contemplation of the beauties of nature. (4) Its use must be maintained by the public themselves in order to keep up the right to the way. Continuous use is necessary, though the public need not use the road every day or every month; yet the right is in danger if use is discontinued for any length of time. But if the public allow themselves to be excluded from the road for seven years the proprietor becomes entitled to continue the exclusion by interdict without raising the question of public right—that is to say, possession for seven years throws the *onus probandi* on the public. According to the law of England such points are not construed in a narrow sense, and they distinctly differ in the following respects: (1) It is not necessary that the right of way be between two public places, and (2) continuous use is not necessary, for no lapse of time as regards user or the claiming of their rights can bar the right of the public to a footpath or a highway once dedicated to them, or where dedication can be assumed. There are, however, statutory provisions for shutting up a road when it become unnecessary. The whole breadth of the originally dedicated road, including what is known as "road wastes," must always remain as the right of way to the public, and cannot be encroached on.

In Scotland there is no public authority for the protection of the interests of the public in rights of way, or for their maintenance. They are in the position of being left to chance; and "what is everybody's business is nobody's business" has resulted in many valuable rights being lost. The public, or individual members of the public, have to incur the costs and risks of litigation in the courts under an action of declarator to recover a road which a proprietor has closed, and it is difficult for them to do this. In England, though there is also no direct public authority for the guardianship of rights of way, yet their maintenance is so far provided for under section 10 of the Local Government (England) Act, 1888, which enacts that county councils "may, if they think fit, contribute toward the costs of the maintenance, repair, enlargement, and improvement of any highway or public footpath in the county, though the same is not a main road."

Both in Scotland and England influential societies exist for the purpose of assisting in the protection of public rights of way—viz., the Scottish Rights of Way and Recreation Society, Edinburgh, founded in 1844 and reconstituted in 1884, and the National Footpath Preservation Society, London, founded in 1884. There are also several societies for special districts. Bills have since 1888 been introduced into the House of Commons by private members with the object of charging a public authority with the duty of protecting and maintaining rights of way, but no legislative measure has yet been passed. See also the section on the law of highways at **ROADS**.

Rights, Declaration and Bill of. The Convention Parliament which called the Prince and Princess of Orange to the throne of England set forth, in a solemn instrument known by the name of the Declaration of Rights, the fundamental principles of the constitution which were to be imposed on William and Mary on their acceptance of the crown. This declaration (February, 1689), drawn up by a committee of the Commons, and assented to by the lords, began by declaring that King James II. had committed certain acts contrary to the laws of the realm, and, having abdicated, had left the throne vacant. The main provisions of the Declaration, and of the Bill of Rights (October, 1689), based on it, were to the effect that the power of suspending and of dispensing with laws by regal authority is illegal; that the commission for creating the late Court of Commissioners for Ecclesiastical Causes, and all commissions and courts of the like nature, are illegal; that the levying of money for the use of the crown by prerogative, without grant of Parliament, is illegal; that it is the right of

the subjects to petition the king, and all prosecutions for such petitioning are illegal; that the raising or keeping of a standing army in time of peace, except with consent of Parliament, is illegal; that Protestant subjects may have arms for their defense; that the election of members of Parliament should be free; that freedom of speech in Parliament should not be questioned in any place out of Parliament; that excessive bail ought not to be required, or excessive fines imposed, or cruel or unusual punishments inflicted; that jurors should be duly impaneled, and that jurors in trials for high treason should be freeholders; that grants and promises of fines and forfeitures before conviction are illegal; and that for redress of all grievances, and the amendment, strengthening, and preserving of the laws, Parliaments ought to be held frequently. The remaining clauses treat of the succession to the crown.

Rights of Man, Declaration of the, a famous statement of the constitution and principles of civil society and government adopted by the French National Assembly in August, 1789. In historical importance it may fairly be ranked with the English Bill of Rights and the American Declaration of Independence. It suggested the title for Paine's defense of the French Revolution against Burke (1791-1792); which was followed by Mary Wollstonecraft Godwin's "Vindication of the Rights of Women."

Rigi, an isolated rocky mountain of Switzerland, in the canton of Schwyz, between Lakes Zug and Lucerne, 5,905 feet high. It affords among the finest views in Switzerland, and is annually visited by numerous travelers. Two railways have been constructed to reach its summit (Rigi-Kulm) from opposite sides. They are on the "rack-and-pinion" principle, there being a central toothed rail into which works a toothed wheel under the locomotive. There is also a short line on the mountain worked on the ordinary principle. Hotels and similar establishments are numerous on the Rigi.

Rigor Mortis, the cadaveric rigidity or stiffness of the body which arises within seven hours after death. It begins with the muscles of the lower jaw and neck, then those of the trunk, next those of the arms, and, finally those of the legs. It ultimately passes off in the same order as it came. It is believed to be due to coagulation of fluid substance in the muscle.

Rig Veda, in Sanskrit literature, the oldest and most original of the four Vedas, and probably the oldest literary composition in the world. In all likelihood it was in course of composition about 1,400 years B. C., but was not committed to writing at that

time. It contains no allusion to writing or writing materials, and Max Müller believes that for a long period it was transmitted orally from generation to generation. It consists of 1,017 short lyrical poems, with 10,580 verses. The religion was nature worship, Indra, the Cloud-compeller, being the chief object of adoration, and, after him, Agni, the God of fire. The Hindu Triad had not yet arisen. The Rig Veda does not recognize the institution of caste. Beef was eaten. Women held a high position, and some of the hymns were composed by them. The rite of suttee was unknown; the conquest of Indra had only begun, and the Ganges, incidentally mentioned, had not become a sacred stream.

Riis, Jacob August, an American author; born in Ribe, Denmark, May 3, 1849, came to the United States in 1869, and was for many years a reporter on the New York "Sun." He was identified with many charitable and social movements in conjunction with Theodore Roosevelt. He wrote "How the Other Half Lives"; "The Children of the Poor"; "Nibsy's Christmas"; "Out of Mulberry Street"; "A Ten Years' War"; "The Making of an American"; etc., and many magazine articles.

Riker, Albert Burdsall, an American clergyman; born in New Albany, O., Oct. 19, 1852; was graduated at Wesleyan University in 1879; held pastorates in Ohio, Tennessee, and West Virginia, and in 1898 became president of Mount Union College, Alliance, O.

Riley, Benjamin Franklin, an American clergyman; born in Pineville, Ala., July 16, 1849; was graduated at Erskine College, South Carolina, in 1871; entered the ministry of the Baptist Church in 1872; was president of Howard College in 1888-1893, and Professor of English Literature at the University of Georgia in 1893-1900. He was author of "History of Conecuh Co., Ala." (1884); "History of the Baptists of Alabama" (1893); "History of the Baptists of the Southern States East of the Mississippi"; "Alabama as It Is"; and numerous pamphlets.

Riley, Franklin Lafayette, an American educator; born near Hebron, Lawrence co., Miss., Aug. 24, 1868; was graduated at the Mississippi College in 1889; and later studied at Johns Hopkins University; was president of Hillman College for Young Women in 1896-1897; and became Professor of History at the University of Mississippi in 1897. He was a member of a number of historical societies; author of "Colonial Origins of New England Senates" (1896); "School History of Mississippi" (1900); etc., and edited a number of historical works.

Riley, James Whitcomb, an American poet; born in Greenfield, Ind., in 1853. His contributions to newspapers and magazines



JAMES W. RILEY.

first attracted public attention about 1875. They appeared under the pseudonym "B. F. Johnson of Boon." His writings soon became so popular that he devoted himself to literature and public reading of his work with great success.

His poems are characterized by both humor and pathos and by their sympathy with the simplest phases of life. Those of the Hoosier type are especially popular. He published, "Old Swimmin' Hole" (1887); "After Whiles" (1887); "Poems Here at Home" (1893); "Green Fields and Runnin' Brooks" (1893); "An Old Sweetheart of Mine"; "Rhymes of Childhood"; "Flying Islands of the Night" etc.

Rime. See RHYME.

Rimini, a city of Italy, stands on the shore of the Adriatic, 69 miles by rail S. E. of Bologna; it is still surrounded with walls and contains many mediæval buildings. The cathedral, the temple altered and built to commemorate the unhallowed love of Sigismundo Malatesta and Isotta degli Atti, a beautiful Renaissance structure, dates from 1446-1450; the Church of St. Giuliano is adorned with pictures by Veronese, and St. Girolamo with a picture of that saint by Guercino. The ancient castle of the Malatesta is now used as a prison. The little river on which the city stands is spanned by a white marble Roman bridge, 236 feet long, with five arches. Beside one of the gates stands the triumphal arch, 46 feet high, erected in honor of Augustus. The spot where Cæsar stood to address his soldiers after crossing the Rubicon (about 10 miles N. W. of Rimini) is marked in one of the squares by a monumental pillar. The city manufactures silks and sail cloth. Pop. 10,838, with suburbs 19,158. One of these suburbs, half a mile distant on the seashore, is much visited for sea-bathing. Originally an Umbrian, and then for several centuries an Etruscan city, Rimini (Ariminum) fell into the hands of the Romans in 286 B. C. They made it the N. terminus of the Flaminian Way from Rome, and the

S. terminus of the Æmilian Way to Piacenza and of the Popilian Way to Venice, and utilized the advantages of its position as a seaport for communicating with the E. side of the Adriatic. After being battled for by Goths and Byzantines, and held by the latter, the Lombards, and the Franks, it became a shuttlecock between the emperor and the Pope. At last, weary of this alternation of masters, neither of whom profited her, Rimini put herself under the protection of the House of Malatesta (1237), whose chiefs soon made themselves absolute masters of her fortunes. Among the tragic episodes that marked the family history of these rulers may be mentioned the killing of Francesca da Rimini and her lover by his brother, and the story of Parisina, the subject of Byron's poem. The most famous or rather infamous member of the family was Sigismundo (1417-1468), a brave and skillful soldier, a scholar, a patron of the fine arts, but a man of brutal animal passions and with no sense of right and wrong. The head of the house sold his rights over Rimini to the Venetians in 1503, but the Pope wrested them to himself in 1528 and kept them till 1860.

Rimu, a New Zealand tree (*Dacrydium cupressinum*) of the yew family. It grows to a height of 80 to 100 feet, and from two to six feet in diameter. Its wood is valued for general building purposes.

Rinderpest. See CATTLE PLAGUE.

Rinehart, William Henry, an American sculptor; born in Carroll co., Md., Sept. 13, 1825; went to Baltimore in 1846; and found employment at his trade of stone cutter. He attended night school at the Maryland Institute and studied art; went to Italy in 1855 and studied under the best masters in sculpture; and while in that city executed two bas-reliefs, "Night" and "Morning," which attracted wide attention. He opened a studio on his return to Baltimore, but in 1858 established himself in Rome. His "Clytie," and "Love Reconciled with Death," in marble, at Baltimore, are noted for artistic feeling in prose. He completed Crawford's bronze doors for the National Capitol at Washington. He died in Rome, Oct. 28, 1874.

Riner, John A., an American jurist; born in Preble co., O., in 1850; was graduated at the University of Michigan in 1879; later removed to Wyoming; became city attorney of Cheyenne in 1881, United States district attorney of Wyoming in 1884, a member of the upper house of the Territorial legislature in 1886, and of the Constitutional Convention in 1889; later was a member of the State Senate, and on Sept. 23, 1890, he was appointed United States district judge for the district of Wyoming.

Ring, any circle or section of a cylinder. Rings of gold, silver, and of other metals and materials have been worn in all

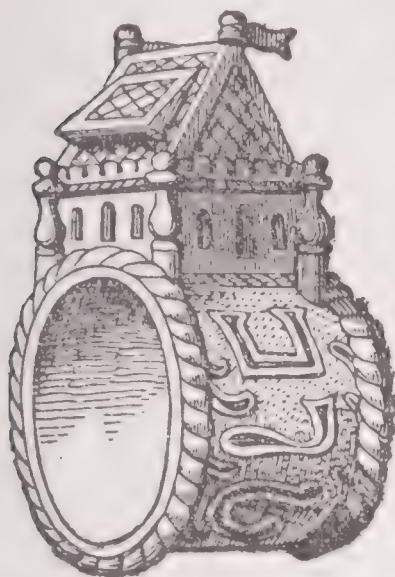


FIG. 1.

times and countries, and while they have been used to decorate the ears, neck, nose, lips, arms, legs, and toes, finger rings have always occupied the most important and significant place among such ornaments. From the earliest period of civilized relationships the finger ring was a convenient means for carrying the signet of its wearer. In Genesis, xxxviii: 17, 18, we read that Judah left his signet as a pledge with his daughter-in-law; and in chap. xli: 42 it is narrated that Pharaoh delivered to Joseph his royal signet as a token of deputed power and authority. From the fact that these ancient rings carried engraved signets early ring-lore is intimately mixed up with the origin and development of gem and seal engraving. Herodotus mentions the wearing of finger rings by the Babylonians; and from Asia the habit probably passed into Greece, though the Homeric poems mention earrings alone. In the later Greek legends the ancient heroes are described as wearing rings, and every freeman throughout Greece seems afterward to have possessed one. The Lace-



FIG. 2.

dæmonians wore iron rings. The Romans are said to have derived the use of rings from the Sabines; their rings were at first, as those of the Greeks, signet rings, but made of iron. Every free Roman had a right to wear one; and down to the close of the republic the iron ring was worn by those who affected the simplicity of old times. Ambassadors, in the early age of the re-

public, wore gold rings as a part of their official dress—a custom afterward extended to senators, chief magistrates, and in later times to the equites, who were said to enjoy the *jus annuli aurei*, from which other persons were excluded. It became customary for the emperors to confer the *jus annuli aurei* on whom they pleased and the privilege grew gradually more and more extensive till Justinian embraced within it all citizens of the empire whether *ingenui* or *libertini*. Rings entered into the groundwork of many Oriental superstitions, as in the legend of Solomon's ring, which, among its many magical virtues, enabled the monarch to triumph over all opponents and daily to transport himself to the celestial spheres, where he learned the secrets of the universe. The Greeks mention various rings endowed with magic power, as that of Gyges, which rendered him invisible when its stone was turned inward; and in old Saxon romances a similar ring legend is incorporated. The ring of POLYCRATES (*q. v.*), which was flung into the sea to propitiate Nemesis, was found by its owner inside a fish; and there were persons who made a lucrative traffic of selling charmed rings, worn for the most part by the lower classes. By many Mussulmans at the present day a ring having enclosed in it a verse from the Koran is worn as an amulet.

Various explanations have been given of the connection of the ring with marriage. It would appear that wedding rings were worn by the Jews prior to Christian times. Fig. 1 shows a Jewish marriage ring beautifully wrought in gold filigree, and richly enamelled, now in the possession of Lord Londesborough. It has been said that as the delivery of the signet ring to any one was a sign of deputing or sharing of authority, so the delivery of a ring by husband to wife indicated her admittance to share his rights and privileges. In pagan times in Europe the ring seems to have been connected with fidelity or with espousals. Fig. 2 shows a form of betrothal ring called a *gimmel*, or linked ring, which is used in later times; the upper figure shows the three parts brought together, the lower figures the parts separately. By an ancient Norse custom, described in the "Eyrbyggja Saga" when an oath was imposed, he by whom it was pledged passed his hand through a silver ring sacred to that ceremony; and in Iceland the ceremony of betrothal used to be accompanied by the bridegroom passing his four fingers and thumbs through a large ring, and in this manner receiving the hand of the bride, as is represented in a woodcut in an old edition of "Olaus Mangus." As lately as 1780 the practice existed in Orkney of a man and woman plighting their faith at the Standing Stones of Stennis, by joining their hands

Ring

through the perforated Stone of Odin. For betrothal, as well as for marriage, a ring is commonly bestowed; and in many countries both spouses wear wedding rings. Though the third finger of the left hand is the official finger, rings are worn on all fingers, and in mediæval times even the thumbs were frequently decorated with large and massive rings. During the 16th, 17th, and 18th centuries it was a very common practice to have mottoes inscribed on rings, including wedding rings, and the motto was called the *posy* or *chanson*. The ring was the symbol of the dominion of Venice over the Adriatic; and yearly, on Ascension Day, a ring was thrown by the Doge from the ship "Bucentaur" into the sea, to denote that as the wife is subject to her husband, so is the Adriatic Sea to the republic of Venice. The reception of a ring forms an essential feature in the investiture of many Catholic dignitaries; and even in the Anglican communion a sapphire "pontifical" ring was presented in September, 1891, to the new Archbishop of York. The "fisherman's ring," containing an engraved representation of St. Peter in an ancient fishing boat, is the official ring of investiture of the Pope. It is broken and remade on the death of each pontiff.

Ring, Bernard Jacques Joseph Maximilien de, a French archæologist; born in Bonn, Rhenish Prussia, May 27, 1799. He devoted himself from his 16th year to the study of archæology, and published "Picturesque Views of the Old Castles of Baden" (1829); "Celtic Settlement in Southern Germany" (1842); "Roman Settlement of the Rhine to the Danube" (1852-1853), crowned by the French Academy; and "History of the Opiques People: Their Legislation, Customs, and Language" (1859). He died in Bischleim, Alsace, in 1875.

Ring, Max, a German author; born in Sauditz, Silesia, Aug. 4, 1817. He produced a great number of novels, notably "The Children of God" (1851); "The Great Elector and the Alderman" (1851); "The Lost Race" (1867); "The Friends of the Soul" (1871); "Chains of Gold" (1881); "Victory of Love" (1886); and "Seekers and Strivers" (1888).

Ringbone, an exostosis or bony tumor mostly met with on the coronet of overworked horses, but sometimes seen on colts, or even newly-dropped foals. Ringbone injures a horse's market value, and is practically incurable.

Ring Dotterel, in ornithology, *Ægialitis* (in older classifications, *Charadrius*) *hiaticula*. It is much smaller than the dotterel, and is distinguished by its black collar and its brilliant, gold-colored eyes. This bird was formerly celebrated in folk-medicine.

Ring Ouzel

To be cured of the jaundice it was held to be only necessary to look fixedly at the bird's eyes with a firm faith in the success of the experiment.

Ring-dove, or **Cushat**, the largest of the pigeons inhabiting Great Britain, a bird which occurs very generally throughout the wooded parts of Europe. It is migratory in countries in which the severe winters preclude the possibility of its obtaining a due supply of food, and even in Great Britain, in which it permanently resides, it appears on the approach of winter to assemble in flocks, and to perform a limited migration, probably in search of food. A bluish-gray color prevails generally over the head, cheeks, neck, back, and rump, while the breast and under parts of the neck are of a purplish red, the belly and thighs dull white. A patch of white on either side of the neck forms a sort of ring or collar. The average length is about 16 or 17 inches. The food of the ring-dove consists of grain, acorns, berries, the leaves and tops of turnips, etc. The nests are composed of sticks and twigs loosely placed together. The birds are wary and shy, and rarely breed in confinement.

Ringed Snake, a harmless colubrine snake (*Tropidonotus* or *Coluber natrix*), with teeth so small as to be incapable of piercing the skin. It is common in England. It feeds on frogs, mice, young birds, etc., which it swallows alive. It is torpid during winter.

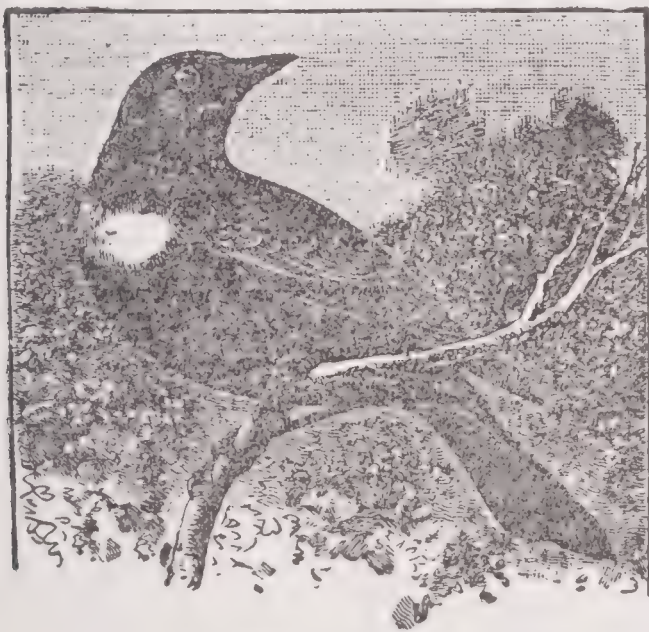
Ringing Island, (1) A poetical epithet applied to England in allusion to the sound of its numerous bells. The name can be traced back to Saxon times. (2) The Church of Rome. It is an island because it is cut off from the world; it is a ringing island because bells are incessantly ringing for religious services; it is entered only after four days' fasting, without which none in the Roman Church enter holy orders.

Ring Micrometer, in optics, a metallic ring fixed in the field of a telescope, and used to determine differences of declination between stars from the differences of time occupied by them in traversing different cords, either of the inner or outer periphery of the ring; a circular micrometer.

Ring Money, a form of currency consisting of rings which seems to have originated with the Egyptians. It is still used in parts of Africa, and is manufactured in Birmingham for the use of African traders. A similar form of money was found by Cæsar among the Celts of Gaul, and appears also to have prevailed in Great Britain, as well as among the Scandinavian nations of Northern Europe.

Ring Ouzel (*Turdus torquatus*, or *Merula torquata*), a species of thrush, rather

larger than a blackbird. It is a native chiefly of the W. parts of Europe; it spends the winter in the S. of Europe, Northern Africa, Syria, and Persia, and visits more N. regions in summer. It occurs frequently in many parts of the British Islands, where it breeds even in the Orkneys, but in very few districts remains all the year round. It is seldom seen in the more cultivated and thickly peopled districts, preferring mountain slopes, heaths, and their vicinity. It begins to breed in the later part of April, and makes its nest generally in heathy banks, often under a bush. The nest is made of coarse grass, within which is a thin shell of clay, and an inner lining of fine dry grass. The eggs are usually four in number, and are greenish blue in color, flecked and spotted with reddish brown; and not infrequently there is a sec-



RING OUZEL.

ond brood in July. The food consists of worms, slugs, insects, and moorland berries, and the bird often makes raids on fruit gardens in its neighborhood; while in vine countries it feeds largely on grapes. In some parts of Scotland it is known as the moor blackbird. It is of a dark-brown, almost black, color; the feathers are edged with blackish gray, the wing feathers more conspicuously with gray, and there is a broad crescentic white gorget — whence the name. The legs and feet are brownish black. The female is lighter and browner, with a narrower and duller gorget. The song consists of a few loud, clear, and plaintive notes, but is somewhat monotonous. See OUZEL.

Ringworm, an eruptive disease of the skin, more particularly on the head, and of which there are several kinds. The most common kind commences with clusters of small light yellow pustules, which soon break and form thin scabs, which, if neglected, become thick and hard by accumulation. When removed, they appear again in a few

days; and by these repetitions the incrustations become thicker and the area of the patches extends, so as, if unchecked, to affect the whole head, and extend also to the forehead and neck. The patches are of an irregular circular form. This disease occurs generally in children of three or four years and upward, and often continues for several years. It is said to occur spontaneously in children ill-fed and uncleanly. The principal local treatment, when the patches are in an inflamed and irritable condition, consists in regular washing or sponging with warm water or some emollient fomentation. When the inflammatory state is diminished, and a dry scaly scab appears, active stimulants are required to effect a change in the disorder. Further, a nutritious diet, warm clothing, tonics, and regular exercise are necessary.

Rinkite, a monoclinic mineral occurring in crystals with various others at Kangerdluarsuk, West Greenland. Hardness, 5; sp. gr., 3.46; color, yellowish-brown; transparent in thin splinters; luster, vitreous, greasy on fracture surfaces. The mean of five analyses gave: Fluorine, 5.82; silica, 29.08; titanic acid, 13.36; protoxides of cerium, lanthanum, didymium, 21.25; yttria, 0.92; protoxide of iron, 0.44; lime, 23.26; soda, 8.98 = 103.11. Lorenzen sug-

gests the formula $2\overset{\text{II}}{\text{R}}\overset{\text{IV}}{\text{RO}}_3 + \text{NaFl}$, in which $\overset{\text{II}}{\text{R}} = \text{Ce, La, Di, Y, Fe, Ca}$, and $\overset{\text{IV}}{\text{R}} = \text{Si, Ti}$.

Rinuccini, Ottavio (rē-nö-chē'nē), an Italian poet and gentleman; born in Florence in 1565. His pastoral "Daphne" was put to music and rendered with great success; and his second pastoral, "Eurydice," was represented at the marriage of Marie d' Medici and Henry IV., and published in 1600. A later lyric drama, "Ariadne at Naxos," is superior to his former productions. His poetry was collected and published in 1622. He died in 1621.

Riobamba. See CAJABAMBA.

Rio de Janeiro, the metropolitan province of Brazil, taking its name from the river Janeiro, which runs through it. It is bounded N. by the province of Espiritu Santo, E. and S. by the Atlantic Ocean, and W. by the extensive region of Minas-Geraes; area, 26,634 square miles; pop. in 1900, 926,035. It is extremely fertile, producing sugar in great abundance, which is accordingly one of its chief exports. The other products are coffee, cotton, maize, rice, indigo, cacao, and fine woods. The country is mountainous, and is well wooded and watered.

Rio de Janeiro, or simply Rio, a city and seaport, capital of Brazil and of the

Rio de Segovia

above province, and the largest and most important commercial city of South America; on the W. side of one of the finest bays in the world, 80 miles W. of Cape Frio. The city stands on a tongue of land close to the shore, on the W. side of the bay, at the foot of several high mountains which rise behind it. The houses are generally built of stone or brick. The streets are straight, well paved, and have excellent footpaths. The convents and churches are numerous, but none of them can be called fine buildings. The cathedral is of a superior style of architecture. Parallel with the beach runs the main street, called Rua de Direita, from which the minor streets branch off at right angles and are intersected by others at regular distances. The imperial palace skirts the beach, and is seen to great advantage from the landing place, which is within 60 yards of its entrance. The other public buildings are the naval and military arsenal, a public hospital, a national library containing about 100,000 volumes, colleges, and other educational establishments. It has, besides, several scientific institutions, a museum of natural history, a botanic garden, and a theater. The harbor is one of the finest known, and indeed can scarcely be excelled for capaciousness and the security which it affords to vessels of every description. The entrance into it from the sea does not exceed a mile from point to point; it afterward widens to about three or four miles, and is commanded in every direction with heavy batteries—all the numerous little islands with which it is interspersed being crowned with artillery. This city is the chief mart of Brazil, and especially of the provinces of Minas-Geraes, St. Paulo, Goyaz, Matto-Grosso, and Curitiba. The mining districts, being most populous, require the greatest proportion of consumable goods, and in return send the most valuable articles of commerce; hence, innumerable troops of mules are continually traveling to and from those districts. The imports consist in immense quantities of dried beef, tallow, hides, grain, salt, provisions, flour, household furniture, pitch, tar, wax, oil, sulphur, woods, slaves, and wine. The exports are cotton, sugar, rum, ship timber, various fine cabinet woods, hides, tallow, indigo, and coarse cotton cloths. Among the more precious articles are gold, diamonds, topazes of various colors, amethysts, tourmalines, chrysoberyls, aquamarines, and wrought jewelry. Pop. (1906) 811,265.

Rio de Segovia. See CAPE RIVER.

Rio Grande. See VERMEJO.

Rio Grande, a river of Western Africa, which enters the Atlantic by an estuary opposite the Bissagos Islands; upper course not well known.

Rio Negro

Rio Grande, Rio Grande del Norte, or Rio Bravo del Norte, a large river of North America, rises in the San Juan Mountains in Southwestern Colorado, and flows generally S. E. into the Gulf of Mexico, forming on its way the entire boundary between Texas and Mexico. Its length is about 1,800 miles; it is for the most part a shallow stream, but small steamboats can ascend for nearly 500 miles. Its chief affluent is the Rio Pecos.

Rio Grande College, a coeducational institution in Rio Grande, O.; founded in 1876, under the auspices of the Free Baptist Church; has endowment funds of \$75,000; grounds and buildings valued at over \$40,000; volumes in the library, about 3,500; scientific apparatus, etc., \$3,000; average number of faculty, 10; average student attendance, 150; ordinary income, \$6,000.

Rio-Grande-do-Sul, the extreme S. province of Brazil; bounded partly by the Atlantic, and bordering on Uruguay and Argentina; area, 91,336 square miles; pop. (1900) 1,149,070. It is well watered, contains much fertile land, and has a healthy climate. On the coast is the large lake or lagoon of Patos, besides others. The chief occupations of the inhabitants are cattle rearing and agriculture. Among the population are 100,000 Germans, there being a number of flourishing German settlements. There are some 600 miles of railway. Hides, tallow, horse-hair, bones, etc., are exported. The capital, Rio Grande, or Sao Pedro do Rio Grande, is situated on a peninsula near where the Lake of Patos communicates with the Atlantic. Its houses are mostly of earth, and its streets unpaved. It has an active trade in hides, horse-hair, wool, tallow, etc. Pop. about 19,000.

Rioja, Francisco de (rē-ō'hä), a Spanish poet; born in Seville about 1585. He was a great scholar, librarian of the royal library and Chronicler of Castile. He was regarded as one of the best poets of his time; and though his poetry is not great, it is distinguished by beauty of form, delicacy of style, and deep feeling for nature. His best known work is "Epístola Moral á Fabio," full of sound advice regarding the superiority of a quiet and unassuming life. He wrote many sonnets under the titles of "To Riches," "To Poverty," "To the Spring," "To the Rose," and "Silvas." His "Poems," with extensive biography, were published in 1867, and additions in 1872. He died in Madrid, Aug. 8, 1659.

Rio Negro ("black river"), the name of numerous streams, of which two are important: (1) A river of South America, and principal tributary of the Amazon. It rises in Colombia, and joins the Amazon

after a course of about 1,000 miles at Manaus, Brazil. Through its affluent, the Cassiquiare, there is direct communication between the Amazon and Orinoco. (2) A river of South America forming the boundary between the Argentine Republic and Patagonia. It rises in the Andes in Chile, and is about 700 miles long. Its current is very rapid, and its bed obstructed with shoals and sand banks.

Riordan, Patrick William, an American clergyman; born in New Brunswick, Aug. 27, 1841; removed to Chicago; was educated in Louvain, Belgium; became Professor of Theology at the Seminary of St. Mary's of the Lake, in Chicago; held charges in Illinois till 1883, when he was consecrated titular archbishop of Cabesa and coadjutor of the Archbishop of San Francisco, Cal., on whose death he succeeded, Dec. 28, 1884.

Riordan, Roger, an Irish-American journalist; born in 1848. He resided in New York city and published: "A Score of Etchings" (1883); and "Sunrise Stories: A Glance at the Literature of Japan."

Riot, a disturbance of the public peace, attended with circumstances of tumult and commotion, as where an assembly destroys, or in any manner damages, seizes, or invades private or public property, or does any injury whatever by actual or threatened violence to the persons of individuals. By the common law a riot is an unlawful assembly of three or more persons which has actually begun to execute the common purpose for which it assembled by a breach of the peace, and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose to the terror of the people, though they had not that purpose when they assembled. In England, every person convicted of riot is liable to be sentenced to hard labor. In Scotch law rioting is termed mobbing. A person may be guilty of mobbing who directs or excites a mob though he is not actually present in it. Mere presence without participation may constitute mobbing. By an act of George I., called the Riot Act, whenever 12 or more persons are unlawfully assembled to the disturbance of the peace, it is the duty of the justices of the peace, and the sheriff and under-sheriff of the county, or of the mayor or other head officers of a city or town corporate, to command them by proclamation to disperse. And all persons who continue unlawfully together for one hour after the proclamation was made, commit a felony and are liable to penal servitude or imprisonment. The act also contains a clause indemnifying the officers and their assistants in case any of the mob should be killed or injured in the attempt to arrest or disperse them.

Most, if not all, of the States of the American Union have riot acts somewhat similar to those of England, and the common law governs where no statutes have been enacted.

Rio Tinto, a river in Southern Spain, in the province of Huelva, near whose sources are rich copper mines; the annual output (copper and sulphur) reaches 1,400,000 tons; these minerals are exported from the port of HUELVA (*q. v.*), 45 miles distant, near the mouth of the river. These mines were worked by the Romans — their Tharsis. During the years of Moorish supremacy they were unused, but they have been worked again since the middle of the 16th century. They were bought in 1872 by the Rio Tinto (London-Bremen) Syndicate for \$20,000,000. Some 10,500 persons are employed in the works, of whom unhappily something like 10 per cent. are usually ill by reason of the unhealthiness of the work.

Riouw. See RHIO.

Ripley, George, an American author; born in Greenfield, Mass., Oct. 3, 1802; educated at Harvard University and Cambridge Divinity School; became a Unitarian minister in Boston; lived some years in Europe; was one of the founders of the Transcendental magazine, the "Dial" (on which he had Emerson and Margaret Fuller as coadjutors); and the originator and conductor of the communistic experiment at Brook Farm. He became literary editor of the New York "Tribune" in 1849, and was joint-editor with Charles A. Dana of the "American Cyclopædia" (1858-1863, 16 vols., also of the second edition). He died in New York city, July 4, 1880.

Ripley, William, Zebina, an American educator; born in Medford, Mass., in 1867; was graduated at the Massachusetts Institute of Technology in 1890; and later studied economics there; became lecturer on Sociology at Columbia University in 1893, and Professor of Sociology and Economics at the Massachusetts Institute of Technology in 1895; and appointed expert agent on transportation for the United States Industrial Commission. He was a member of a number of scientific societies; and author of "Financial History of Virginia"; "The Races of Europe" (1900); and of many articles in periodicals.

Ripple Mark, furrows, on sandstone of all ages, produced by the ripple of the tide on what was once the sandy shore of an ancient sea, or water from 8 to 10 feet, or, in rarer cases, from 300 to 450 feet, deep. Beach ripple may generally be distinguished from ripples due to currents by the frequent changes which occur in its direction.

Risley, Samuel Doty, an American physician; born in Cincinnati, O., Jan. 16, 1845; served in the Union army during the Civil War; was graduated at the University of Iowa in 1868, and at the Medical Department of the University of Pennsylvania in 1870; was Professor of Diseases of the Eye in the Philadelphia Polyclinic; surgeon at the Wells Eye Hospital of Philadelphia, and consulting ophthalmologist of the Vineland Training School for Feeble-minded Children. He was lecturer and assistant surgeon in ophthalmology in the Medical Department of the University of Pennsylvania; made improvements on the optometer and ophthalmoscope; was a member of many medical societies; and author of articles on "School Hygiene" in "A System of Diseases of the Eye"; and other technical papers.

Rishi, Rishis, or Rikhi, in Hindu mythology, (1) seven ancient sages credited with the composition of the Vedic Hymns. The rishi of a mantra in any of the Vedas is the sage by whom it was composed or recited. In later times the whole Brahmanical caste pretended to trace their descent from the seven Vedic Rishis, but the Veda itself speaks of Royal Rishis (Rajarshis), who were probably of the Warrior caste. (2) Any Brahmanical sage considered to be infallible. In Hindu astronomy, the seventh asterism of Ursa Major, or the sage to whom belongs any one of its seven conspicuous stars.

Rissole (rīs'öl), in cookery, an entrée consisting of meat or fish mixed with bread-crumbs and yolk of eggs, all wrapped in a fine paste, so as to resemble a sausage, and fried.

Risso's Grampus, in zoölogy, the *Grampus griseus*. The head is fuller and rounder than that of a porpoise, and its flippers are longer and narrower. Prevailing tint gray, darker above, lighter below, the markings on sides varying considerably. Found on the French and English coasts in summer; probably visiting Africa or America in winter.

Ristori, Adelaide, an Italian actress; born in Cividale, Italy, Jan. 29, 1822. At a very early age she played in comedy, but afterward appeared in tragedy. She married the Marquis Capranica del Grillo in 1847, and afterward played in all the chief European capitals and in the United States. She took her farewell of the English stage in Manchester, Nov. 8, 1873. Among her chief characters were Medea, Francesca da Rimini, Marie Antoinette, Mary Stuart, and Lady Macbeth. In 1884 she visited the United States for the last time. She died Oct. 9, 1906.

Ritchie, Mrs. Anna Cora (Mowatt), an American author; born in Bordeaux,

France, in 1822. She went in early life to New York. A once popular actress, she retired from the stage in 1854, and devoted herself to the production of romances and dramas with no little success. Some of her books were published under the pseudonyms of "Isabel" and "Helen Berkeley." They include: "The Fortune-Hunter" (1842); "The Mute Singer," "Fashion," a comedy (1847), which was very popular; "Evelyn" (1845); "The Autobiography of an Actress" (1854), the best-known and most popular of her productions; "Mimic Life" (1855); "Fairy Fingers" (1865); "The Clergyman's Wife" (1867); etc. She died at Henley-on-Thames, England, July 28, 1870.

Ritchie, Anne Isabelle (Thackeray), an English author, daughter of William Makepeace Thackeray; born in London in 1838. Among her writings are: "Old Kensington" (1873); "Toilers and Spinners" (1873); "Bluebeard's Keys" (1874); "Miss Angel" (1875); "Mme. de Sévigné" (1881); "Records of Tennyson, Ruskin, and Browning" (1892); "Lord Tennyson and His Friends" (1893); and with R. Evans, "Lord Amherst and the British Advance Eastward to Burma" (1894).

Ritornello (Italian), in music, a short repetition as of the concluding phrases of an air; or a passage which is played while the principal voice pauses; or it often signifies the introduction to an air or any musical piece. Ritornelli are also Italian popular songs in stanzas of three lines each. The meter and number of the syllables are not subject to rule. The first line, however, is generally the shortest.

Ritschl, Albrecht, a German theologian; born in Berlin, Germany, March 25, 1822. His university studies were carried on at Bonn, Halle, Heidelberg, and Tübingen. In 1846 he "habilitated" at Bonn, the subject of his thesis being the relation between the gospel of Marcion and the canonical gospel of Luke. Ritschl, who had become Professor extraordinarius of Theology at Bonn in 1853, was promoted to an ordinary professorship in 1860, and in 1864 was transferred to Göttingen, where the rest of his life was spent. His lectures, especially those on Christian ethics, soon became famous for their originality and vigor. Ritschl is usually classified as an "eclectic mediating theologian"; perhaps "intermediate" would be a better word, for his theology is uncompromisingly opposed alike by the "rationalists" and by the "orthodox" parties. The Ritschlians now form a large and important school in Germany, the most prominent among them being Kaftan, Herrmann, and Bender. His principal work, on the Christian doctrine of

justification and reconciliation, was published in three volumes (1870-1874); the first of which traces the history of the doctrine, the second discusses its Biblical premises, and the third its theological meaning. An English translation of the first volume appeared in 1871. The work as a whole expounds with much force and effectiveness a theological system marked by great dialectic acuteness and subtlety, ingenious and searching exegesis, and bold disregard of ecclesiastical tradition. The distinguishing feature of the Ritschlian theology is perhaps the prominence it gives to the practical, ethical, social side of Christianity. Among his works are "A Treatise on Christian Perfection"; "A Tract on Conscience"; "A Tract on Theology and Metaphysics"; etc. He died in Göttingen, March 20, 1889.

Ritson, Joseph, an English antiquarian; born in London, England, Oct. 2, 1753. He became a conveyancer in London and deputy-high-bailiff to the duchy of Lancaster, and edited many old and rare books. He was noted for his industry and integrity, but was a quarrelsome critic. His chief works are: A "Select Collection of English Songs" (1783); "Ancient Songs from the Time of King Henry II. to the Revolution" (1790); a "Collection of Scottish Songs" (1794); "Robin Hood Poems" (1795); "Ancient English Metrical Romances" (1802); etc. He died in 1803.

Rittenhouse, David, an American astronomer; born near Philadelphia, Pa., April 8, 1732. Originally a clock and mathematical instrument maker, he became master of the United States mint, and succeeded Franklin as president of the American Philosophical Society. He was the first to use spider lines in the focus of a transit instrument. He died in Philadelphia, Pa., June 26, 1796.

Ritter, Frédéric Louis, an American musician; born in Strasburg, Alsace, in 1834; came to the United States in 1856, and soon made a reputation both here and abroad as a writer on musical topics. Besides many articles in English, French, and German periodicals, he published: "A History of Music in the Form of Lectures" (1870-1874); "Music in England" (1883); "Music in America" (1883); "Manual of Musical History" (1886); and "Musical Dictation" (1888). He died in Antwerp, Holland, July 6, 1891.

Ritter, Heinrich, a German philosopher; born in Zerbst, Germany, Nov. 21, 1791; studied theology and philosophy at Halle, Göttingen, and Berlin from 1811 to 1815. In 1824 he became an extraordinary Professor of Philosophy in Berlin, accepted an ordinary professorship at Kiel in 1833, and subsequently occupied the chair of philos-

ophy at Göttingen University from 1837 till his death. Ritter's chief work is a general "History of Philosophy" ("Geschichte der Philosophie"; 12 vols. 1829-1855). He also published a "System of Logic and Metaphysics"; a "Cyclopædia of the Philosophical Sciences"; a popular Treatise on Immortality; and other works. He died in Göttingen, Feb. 3, 1869.

Ritter, Karl, a German geographer; born in Snedlinburg, Prussia, Aug. 7, 1779; studied at Halle, became a private tutor in 1798, and in 1819 succeeded Schlosser as Professor of History at the Frankfort Gymnasium. He then published an "Introduction to the History of European Nations Before Herodotus," 1820; and in the same year became Professor extraordinary of Geography at the University of Berlin, where he remained till his death. His great work is "Geography in Its Relations to Nature and History," the two first volumes of which appeared in 1817-1818, but it ultimately comprised upward of 20 volumes. He wrote several other geographical works, and contributed extensively to the journals of the Berlin Geographical Society. He died in Berlin, Sept. 28, 1859.

Rittingerite, a rare mineral occurring in small rhombic tables, with native arsenic, at Joachimsthal, Bohemia, and Schemnitz, Hungary. Crystallization, monoclinic; hardness, 1.5-3; luster, sub-metallic to adamantine; color varying, dull, honey-yellow to hyacinth-red, sometimes blackish in parts; streak, orange-yellow. Composition not definitely ascertained, but consists essentially of arsenic, selenium, and silver.

Ritual, the name of one of the service books of the Roman Church, in which are contained the prayers and order of ceremonial employed in the administration of certain of the sacraments (communion out of Mass, baptism, penance, marriage, extreme unction) and other priestly offices of the Church, forms for churchings, burials, and blessing. In its present form it dates from the Council of Trent, which directed a revision of all the different rituals then in existence (also known as *manuale*, *sacerdotale*, etc.), which were numerous, and exhibited considerable variety of detail. Paul V., in 1614, published an authoritative edition, which has frequently been reprinted, and of which a further revision was issued by Benedict XIV. Besides the Roman ritual there are many diocesan rituals, some of which are of much historical interest. In the Greek Church, as in the other Eastern communions, the ritual forms part of the general collection (which contains also the Eucharistic service) entitled "Euchologion." In the Anglican Church the "Book of Common Prayer" may be said to contain the ritual. The most approved

commentary on the Roman ritual is that of Barrufaldo.

Ritualism, a strict adherence to rites and ceremonies in public worship. The term is more especially applied to a tendency recently manifested in the Church of England, resulting in a series of changes introduced by various clergymen of the High Church party into the services of the Church. These changes may be described externally as generally in the direction of a more ornate worship, and as to their spirit or animating principle, as the infusion into outward forms of a larger measure of the symbolic element. They are defended on the grounds of law, ancient custom, inherent propriety, and divine sanction or authority. The Ritualists hold, with most others, that all authoritative and obligatory regulation on ritual is not laid down in the New Testament, but they, or many of them, maintain that a knowledge of what is obligatory in ritual is derived from apostolical tradition, going back to apostolical times. They argue that the design of the institution of Christianity was not to abrogate the external ceremonials by which the patriarchal and Mosaic dispensations in the Old Testament were distinguished; but to replace them by a higher ceremonial, and they explain the comparative simplicity of primitive worship by the secrecy and restraint to which the early Church was subjected. The points of ritual about which there has been the most violent contention are those which involve the adoration of Christ as present on the altar under the forms of bread and wine. Other points are: The E. position of the priest at consecration; lights on the holy table; the use of various vestments; the use of incense; mixing water with wine for communion; fasting before communion from previous midnight; regular confession to a priest, with absolution and penance; etc. The legal position of the Ritualists is that the first Book of Common Prayer, issued in the second year of Edward VI. (1549, with alterations made in 1552, 1604, and 1662), is still the guide of the Church in all matters pertaining to ritual, the present prayer book not being in itself complete, but referring to this first prayer book in its opening rubric. Various judgments have been given in ecclesiastical courts against extreme Ritualists, and some of their proceedings have been pronounced illegal. Ritualistic practices have been generally condemned by the bishops, and an act of Parliament giving them power to restrain innovations of this kind came into force on July 1, 1875. The ritualistic movement in the Church of England arose out of the High Church movement inaugurated by the Tractarians.

Ritualism in the United States. Ritualism apparently first became prominent in the United States in Boston, the home of Puritanism, where scarcely two centuries ago Episcopalians were not tolerated at all. The old Church of the Advent seems to have been the birthplace of ritualism in America during the incumbency of the late Rev. Dr. Crosswell. The worship established by him would not be deemed very ornate now, but it was so great an advance on the unsung service and black-gowned preaching of the time that Bishop Eastburn refused to hold confirmation in his church, and Dr. Crosswell had to send his candidates for confirmation to other churches which the bishop did visit.

The first church in New York city which had distinctively the reputation for ritualistic practices, such as is borne by St. Mary the Virgin's and several kindred churches of today, was a missionary chapel over a stable in Madison street, conducted by the Rev. John Hecker, a brother of Father Hecker, about 1857. What induced Father Hecker to enter the Roman Catholic Church merely made his brother a High Churchman. At this day Mr. Hecker would not be considered much of a ritualist. He had candles on the altar, the clergy wore some of the vestments peculiar to ritualism, and the Gregorian chant formed the musical feature, but the service was by no means so ornate as it is in nearly a dozen metropolitan churches of today. It created commotion because it was the first in the field. St. Alban's, in E. 47th street, was perhaps the first church which would be considered very ritualistic according to the advanced modern ideas. As long ago as 1865 its worship was so ornate as to make Low Churchmen stare and gasp. It would even be considered decidedly ritualistic today, for the ritual was as rich as it could be very well made. St. Ignatius's was the next church to get a reputation for ritualism. It was built in 1871 for Dr. Ewer when his advanced views had compelled him to resign from Christ Church.

Such practices shocked and scandalized Low Churchmen so short a time ago as the Civil War, and even later. Yet the outward and visible signs of Puseyism, as it used to be called, in the shape of the lighted altar candles and elaborate vestments, are commanded in the English Church, and, a canon to the contrary notwithstanding, are allowed in the American. The "ornaments rubric" of the Prayer Book of the Church of England reads as follows:

And here is to be noted that such ornaments of the Church and of the ministers thereof, at all times of their ministration, shall be retained and be in use, as were in this Church of England, by the authority of Parliament, in the second year of the reign of King Edward the Sixth.

Now the "ornaments" of the ministers in the year referred to are set forth in the rubrics to the Communion Office in the Prayer Book of 1549, and this is the first:

Upon the day and at the time appointed for the ministration for the holy communion the priest that shall execute the holy ministry shall put upon him the vestments appointed for that ministration, that is to say, a white albe plaine, with a vestment or cope.

A companion clause directs that the priests' assistants shall wear "albes with tunicles." In an introduction to these rubrics the Communion Office is spoken of as being "commonly called mass." The vestments mentioned in these rubrics are some of those commonly worn by the priests in what are called Ritualistic churches. The ornaments rubric in the English Prayer Book is preceded by another, directing that "the chancels shall remain as they have done in times past." Both rubrics, it is seen, are mandatory, and consequently every Church of England clergyman who does not wear alb, chasuble (that being the "vestment" meant), and cope when ministering the Communion Office is violating the chief of the rubrics.

The ornaments of the English churches in 1549 are known to have been candles and crosses on the altar, sacred pictures there and elsewhere, nearly everything, indeed, which is considered peculiarly ritualistic. The English Ritualists construe "the times past" specified in the chancels rubric to mean the period before the Reformation, when crucifixes and images of the Blessed Virgin were part of the ornaments of the chancel. In this they are not upheld by the courts, as the proceeding to oust the figures of the Madonna and Child from the reredos of St. Paul's Cathedral shows. Apparently the chapter of St. Paul's will only be able to save its magnificent reredos from mutilation by pleading the technicality that the figures, being in relief, are not really images; for, though pigeon-holed just now, the proceeding is not likely to be dropped till some decision is reached. But the extreme ritualistic practices which are sanctioned, if not commended, by the ornaments and chancels rubrics, have not been condemned in any trial by the courts, ecclesiastical and civil. It is only when the Ritualists have carried these practices to an extreme which was not authorized by these rubrics that the decisions have been against them. The decision in the case of the Bishop of Lincoln makes evident also that some of the practices formerly condemned are now authorized, though the decision forbids making the sign of the cross, "that sacred and edifying gesture," as Dr. Dix called it in one of his Lenten lectures.

In addition to the rubrics referred to, the English Ritualists use the homilies to sustain their teaching of the real presence

in the sacrament and other apparently Roman Catholic beliefs. These doctrines the 35th of the 39 Articles declare to "contain a godly and wholesome doctrine and necessary for these times." The Book of Homilies prepared by Cranmer and his contemporaries to explain and defend the newly prepared prayer book countenances nearly all the dogmas and practices of the Roman Church except the infallibility of the Pope and the Immaculate Conception of the Blessed Virgin, and these were not proclaimed till three centuries after the first book was prepared. Moreover, Pope Pius IV. is said to have been willing to permit the use of the prayer book of Queen Elizabeth, which did not differ in essentials from the first prayer book of Edward VI., provided he was acknowledged as head of the Church.

Without either the ornaments rubric or the homilies to sustain them, the American Ritualists have, as a rule, been able with impunity almost to out-ritualist the English co-ritualists. Things are done openly in the United States which in England are done only secretly, if at all. For instance, in St. Ignatius's Church, in W. 40th street, a legend on the vestibule wall announces that "A red light burning in the sanctuary lamp signifies that the blessed sacrament is reserved in the tabernacle on the altar." Another announcement sets forth that "Confessions are heard on Saturday from 3 to 5 P. M. and from 7:30 to 9 P. M." Now, the reserving of the sacrament is held to be contrary to Article XXVIII. of the Articles of Religion, and while it is doubtless done at times in England at some, if not at almost all, of the Ritualistic churches, the announcement of the fact is nowhere so openly made. So also, while confession is practised to a great extent as a preliminary to Communion, the hours for it are not conspicuously announced, if at all, even at such notoriously Ritualistic churches as St. Alban's, Holborn, whose late rector, the Rev. Mr. Mackonochie, was so bitterly assailed by the Low Churchmen.

The authority for confession and the form of absolution after confession employed in the United States, as well as in England, are taken from the order for the visitation of the sick in the English Prayer Book:

Here shall the sick person be moved to make a special confession of his sins, if he feel his conscience troubled by any weighty matter. After which confession the priest shall absolve him (if he humbly and heartily desire it) after this sort:

"Our Lord Jesus Christ, who hath left power to His Church to absolve all sinners who truly repent and believe in Him, of His great mercy forgive thee thine offences: And by His authority committed to me, I absolve thee from all thy sins. In the name of the Father, and of the Son, and of the Holy Ghost."

The formula for confession pronounced by the penitent is borrowed, in an expurgated form (reference to the Blessed Virgin

and the Saints as heavenly witnesses being generally omitted), from old contemporaneous Roman Catholic manuals. In a similar way the formula for blessing holy water and for administering extreme unction is borrowed from the Sarum use, that is, the missal of the diocese of Salisbury, from which the prayer book of the Established Church is chiefly compiled. People who think that holy water is to be found in none but Roman Catholic churches have only to visit St. Ignatius's to be convinced to the contrary. In the rear of the edifice they will find a marble fount containing water which has been blessed, presumably, by the Sarum formula, and in which the faithful followers of Father Ritchie dip their fingers as they cross themselves preliminary to making a genuflexion in reference to the Holy Sacrament, which the presence of the red light declares to be present on the altar. There is a similar red light at St. Mary the Virgin's, with the same indication. As in Roman Catholic churches, this sanctuary lamp burns perpetually before the altar in these Episcopal churches as symbolical of the Eternal Light. The seven other lamps which are lighted on ornate occasions were said recently by Father Ritchie, as the incumbent at St. Ignatius's is generally called, to be for decorative purposes. Their being of the sacred number of seven would seem to imply that they are not there merely to inculcate the doctrine of sweetness and light, but are representative of the seven lamps of Revelation, as well as an amplification of the Eternal Light idea.

The two tall candles which are found on the altars of most Ritualistic churches, and which are only lighted at communion time, are typical of the double nature of Christ, and also signify that "He is the very true light of the world." The additional candles, which, to the number of 50 or more, render radiant Ritualistic chancels, and give brightness and splendor to the worship, may, perhaps, stand in the same relation to the two candles that the seven lamps stand in to the sanctuary lamps.

The use of the incense is supposed to represent the prayers of the congregation, and is founded on Revelation v: 8, "Golden vials full of odors which are the prayers of saints." It is allowed in the English Church, probably on the assumption that the censer was one of the ornaments of the churches of King Edward the Sixth's time. Its use in the United States, in which it is theoretically not allowed, is much more general. While crosses and perhaps such pictures as the series illustrating the "Way of the Cross" are allowed, on the plea that they were among the ornaments of the church in 1549, crucifixes and images, not being among them, are considered contrary

to the canons. Yet they are to be found in some Ritualistic churches.

Of the "ornaments" of the ministers prescribed in the First Prayer Book of King Edward VI. the alb is a white garment extending nearly to the heels, something like the surplice, but with tight sleeves, and fitting more closely to the body, so as to permit of an outer garment being drawn over it.

The chasuble, the "vestment" mentioned in the rubric, is a short cloak gathered up at the arms, so as to be of an oval form.

The cope, the alternate or additional vestment prescribed, is a sort of long cloak in the form of a semi-circle, reaching from the neck to the heels, and held together under the throat by a jeweled clasp which has a mystic significance.

The tunicle, the garment worn by the deacons or assistant priests, is a long robe with sleeves, open at the sides for about two feet.

The maniple, originally a strip of linen attached to the left arm of the priest, to wipe the chalice with, has blossomed into the rich addition to the priestly sleeve worn by the assistants as well.

The stole, the familiar narrow black band of silk hanging from the neck of ordinary Episcopal clergymen, is a much more ornate article when worn by Ritualistic priests, and is sometimes jewelled. The vestments and their accompaniments and also the altar cloths are of different colors, according to the different seasons of the ecclesiastical year. White is the color for Christmas, Easter, and the Saints' days, purple for Advent and Lent, black for Good Friday, and green for ordinary days. The "ornaments" named are of rich material, the cope being embroidered with the initials I. H. S. (Jesus Hominum Salvator). The alb and companion white garments are often of lace. The silk girdle and the berretta, the cap worn by Ritualistic priests, are all there is room to add to an already long list of what Low Churchmen regard as Romish millinery.

As Ritualists recognize all the seven sacraments, that of extreme unction is given by priests to penitents sick unto death or in danger of dying. The formula is found in the old Sarum Use. This Use, by the way, has taken the place of the Book of Common Prayer in some of the services of the Church of the Advent, Boston. Father Grafton, Bishop of Fond du Lac, was formerly one of its clergy. He is the first monk outside of the Roman Church to be made a bishop since the Reformation.

During Holy Week the offices of Tenebræ and of the Way of the Cross, functions considered peculiarly Roman Catholic, are recited in the more advanced Ritualistic churches. The Three Hours' Agony serv-

ice held on Good Friday, to be sure, is no longer confined to Ritualistic churches, but is held in some that are Evangelical, such as St. George's.

The custom of making the sign of the cross is more general in England than in the United States, where it is infrequent outside of Ritualistic churches. The same is true of genuflexions to the altar. Ritualists cross themselves at the words "Deliver us from evil" of the Lord's Prayer, the "life everlasting" of the creed, and whenever the benediction is said. Where there is holy water this plays a part in the crossing oneself by a Ritualist on entering a church. His obeisance to the altar which follows is either due to the reservation of the Host on the altar, or, according to the late Dr. Ewer, it is made on the principle on which the members of the English Upper House bow to the empty throne in recognition of the royalty which is not present. This genuflexion nearly becomes prostration when in the communion service the sound of a bell signifies that the elements are being elevated, contrary to the Articles.

With Ritualists of this sort, the "Hail, Mary!" is an ordinary invocation, and extemporized prayers to the Blessed Virgin are not uncommon. Altogether there is scarcely a practice in vogue in the Roman Church, and scarcely a doctrine taught by it or believed by its members, except the infallibility of the Pope, and perhaps the Immaculate Conception of the Blessed Virgin, which is not practiced and believed by advanced Ritualists.

Not only has the First Prayer Book of Edward VI. been naturalized in this country by Dr. Dix, who has written an additional preface to it advocating its use, but various Roman Catholic books of devotion containing prayers and ceremonies distinctively Roman are found in the hands of Ritualists.

Yet the opponents of the Ritualists refer to the additional canons of the general convention of 1874 as positively prohibiting all these more pronounced practices and accessories of ornate worship, the vestments, the incense, altar lights, and the rest. There is scarcely a single act or practice of Ritualistic priests, they say, which is not prohibited by the canons. At every Ritualistic church these canons are violated every day in the year. Before the very general convention which passed the canons under consideration, Bishop De Koven uttered in rebuke the following Confession of Faith:

I believe in the real, actual presence of the Lord under the form of bread and wine upon the altars of our churches. I myself adore, and would, if it were necessary or my duty, teach my people to adore Christ present in the elements under the form of bread and wine.

Almost the only thing which of late years has incurred Episcopal or other official ecclesiastical censure has been the Ritual-

istic practice of compelling communicants to come to communion fasting and not letting them partake of the high celebration. The result of this exclusion is that the priest partakes alone at the high mass celebration, which is contrary to the rubric, as it makes a mass of the communion, but for that very reason the practice is popular with some Ritualists.

Rivarol, Antoine, a French satirist; born in Bagnols, Languedoc, about 1754; was one of the most brilliant wits of the 18th century. His first work of importance, the discourse "On the Universality of the French Language," took the prize at the Academy of Berlin in 1784. His "Little Almanac of Our Great Men" (1788), a volume of satires against authors of his day, and a free translation of Dante's "Inferno," were both particularly successful. He also wrote a "Dictionary of the French Language," and "Letters to the Duke of Brunswick." His "Works" appeared in 1808. He died in Berlin, April 13, 1801.

Rive-de-Gier, a town of France, department of Loire, stands on the Gier, in the middle of the best coal field in France, 13 miles N. E. of St. Etienne. It was formerly a stronghold, surrounded by high walls, and defended by a castle. In 1815 it had less than 4,000 inhabitants; in 1886, 13,728. Around the town there are about 50 coal mines in operation, and in it and close to it several silk mills, glass works, factories for steam engines and other machinery, and iron and steel factories.

River. Water falling on the land in the form of rain, or resulting from melting snow, or rising to the surface in springs, flows over the surface to a lower level. Where two slopes of land dip together the surface drainage collects to form a stream, and when evaporation is not very rapid several such streams ultimately unite and the volume of water they carry flows to the sea or to a salt lake. Small streams are termed runnels, rivulets, rills, brooks, becks, or burns; large streams are termed rivers, but the word has no precise reference to the magnitude of the stream to which it is applied. Dr. Johnson gives as definitions: "Brook, a running water less than a river"; and "River, a land current of water bigger than a brook," and this fairly illustrates the use of the words as popularly applied.

The beginning of a stream — whether brook or river — is called its source, and may be a spring issuing from underground, a lake or marsh in which rainfall accumulates, melting snow, or simply the gathering tricklings from falling rain. The path of a stream is its course, and is the line of lowest level from the source to the end,

River

which if occurring in a lake or the sea is termed its mouth. The connected streams which unite in one river form a river system. The series of convergent slopes down which a river system flows—the land which it drains—forms its basin or catchment area, and the name watershed is also sometimes erroneously applied to it. The names watershed, waterparting, and divide are used to designate the boundary line separating adjacent basins. A watershed is always the meeting place of the highest part of divergent slopes, and from the characteristic form of continents the main watershed of a continent is almost always the crest of a range of mountains. In many cases, however, the diverging slopes meet in a low plain the summit of which may be occupied by a great marsh whence rivers creep away in opposite directions. The basins of all the rivers draining into the same ocean are called collectively the drainage area of that ocean. The main river to which the others are said to be tributary gives its name to the whole river system. It is often difficult to decide which of several converging streams is entitled to carry the name of the main river to its source. Some geographers give this distinction to the longest, others to that with the highest source, and others to that with the most direct course. This diversity of opinion is increased when the name of a river leaving a large lake is given to one of several nearly equal streams which enter it. Hence it is that different computers disagree as to the length of rivers. The course of a typical river has been divided into three parts, though these are not represented in all cases. The torrential or mountain track is the steepest, its gradient usually exceeding 50 feet in a mile, and the velocity of its current being very great. The valley or middle track has a gradient which is rarely greater than 10 feet and often less than 2 feet in a mile. The plain track nearest the mouth of a river has a gradient of only a few inches in a mile. Rivers such as the Amazon, Mississippi, Ganges, Volga, and the long rivers of Siberia, in which the plain track is of very great length, are the most valuable for navigation, the limit of easy navigability being a gradient of about 1 foot in a mile.

The velocity of a river is proportional to the slope of the bed, but it also bears a relation to the depth of the channel and the volume of water flowing in it. On account of friction on the bottom and sides of the channel retarding the stream, the water flows fastest on the surface and in the middle. The carrying power of a river for suspended solid particles and for stones and gravel pushed along the bed depends on the velocity alone. The following table shows how rapidly the carrying power falls off as the velocity diminishes.

River

0.170	mile	per	hour	will just begin to work on
				fine clay
0.340	"	"	"	lift fine sand.
0.454	"	"	"	lift sand as coarse as lin-
				seed.
0.682	"	"	"	sweep along fine gravel.
1.364	"	"	"	roll along rounded pebbles
				one inch in diameter.
2.045	"	"	"	sweep along slippery angu-
				lar stones as large as an
				egg.

Rivers in flood, even in the plain track, sometimes attain a velocity of over 5 miles an hour, and torrents may even flow as fast as 20 miles an hour. The course of a river is gradually carved out and shaped by the flow of the water. The sediment and stones carried along are powerful erosive agents in the torrential and valley tracks, and the character of the valleys or gorges produced depends largely on the geological structure of the region. The course of a river is frequently determined by lines of faults, but perhaps more often it appears to be independent of the nature of the strata. Some great rivers, notably the Volga, press against the right bank, cutting it into a steep cliff, while the left bank is left as a very gentle slope. This is explained by the directive influence of the earth's rotation.

Rivers are of very great importance as agents of change in dynamic geology, the form of valley they excavate being determined partly by the nature of the rocks, partly by the climate. In rainless or arid regions steep-walled canons are cut to a great depth across high plateaus; in rainy regions subaerial denudation leads to the formation of wide valleys of much gentler slopes. Bars of more durable rock crossing the course of a stream lead to the formation of waterfalls or rapids from the rapid erosion of the softer strata below. The river above the obstruction is reduced to what is termed the base level of erosion; the velocity of the current is checked, and wide alluvial deposits are laid down on either side. In course of time the bar of hard rock is completely cut through by a gorge, and the gradient of the stream is ultimately rendered uniform. In this way the common features of gorge and meadow are produced again and again along the course of a stream. The deposits of alluvium form terraces along the valley track of a river, and as the stream cuts its channel deeper they are left at various heights as monuments of its erosive power. When a river is fairly established in its valley it is, geologically speaking, a more permanent feature than lakes or mountains. Upheaval, which acts very slowly, may even elevate a range of mountains across its course, yet all the while the river, cutting its way downward, remains at the same absolute level. The Uintah Mountains, as they were upheaved, were divided in this way by the Green river, the chief tributary of the Colorado. In limestone regions the solvent power

of river water on carbonate of lime leads to the formation of caves and underground rivers, which as a rule emerge from their subterranean channels on lower ground. Sometimes they do not reappear on land, but discharge their fresh water through openings in the bed of the sea. Such submarine river entrances are not uncommon along the shores of the Adriatic, off the coast of Florida, and in other calcareous regions. When a river advances along a nearly level plain toward the sea its carrying power falls off; gravel, sand, and finally mud are deposited on its margin, and the stream pursues a peculiar winding course. During a flood the swift and muddy stream rises, overflows its banks, and widens out on the level land. The current is at once checked and a long bar of deposit forms along each margin. These are increased in height by each successive flood, and, the river bed being simultaneously silted up, broad muddy rivers like the Mississippi, Po, and Hoang-ho come in time to flow along the top of a gently sloping natural embankment, the sides of which are termed levees in Louisiana. Professor Lapparent, calculating from Dr. Murray's data regarding the amount of sediment carried down by rivers finds that they would suffice to wear the entire surface of the land down to sea-level in 4,000,000 years. The entrances of rivers into lakes or the sea are usually marked by great bands of deposit, or by bars of gravel or sand. In some cases, however, such as the River Plate, the Thames, and Tay, the mixture of river and sea water is gradual, and the sandbanks are spread over a very large area, but not built up into a delta at any one place. Prof. Osborne Reynolds has shown, by a remarkable series of experiments, that the form of the sandbanks is due to the outline of the coasts of the estuary and to the tides. In a few instances, such as the Forth, rivers enter deep arms of the sea in which neither banks nor bars are formed. The Congo sweeps directly into the ocean, throwing down great banks of deposit along the continental slope to right and left, but leaving a deep cañon-like gully for the bed of the stream itself; a similar condition occurs where the Rhone enters the Lake of Geneva.

The ultimate source of all rivers is the condensation of water vapor from the atmosphere in the form of rain, snow, and even dew. If the land were composed of impermeable rocks all the rainwater not lost by evaporation would run off directly over the surface, and rivers would only flow during and immediately after showers. A large part of the rainfall, however, soaks into the soil, which retains it as in a sponge, especially if the land be marshy, and allows it to flow off gradually as superficial springs. Some also percolates deeply into

the rocks, ultimately emerging as deep-seated springs at a great distance. The indirect and permanent supply of water to rivers by springs and by the outflow of lakes is independent of local rainfall at the time, and serves to maintain the volume of the river at a certain minimum during the dry seasons. When a river flows toward a region of great evaporation and small rainfall, such as exists in the interior of each of the great continents, evaporation removes more water than is supplied by the remote tributaries, and the stream may fail to fill the hollow it enters, and therefore cannot overflow into the sea. This is the case with the Oxus entering the Aral Sea, and the Volga entering the Caspian. It may be that evaporation is so far in excess of contributions from distant rainfall or snow-melting that the river dries up as it flows, and its last remnant is absorbed in the desert sand. This is the fate of the Murghab, the Heri-rud, the Zerafshan, and many other rivers of central Asia.

Contrasted with these cases are those in which the periodical or occasional increments of direct inflow increase the volume so much as to cause a great rise of level or even extensive inundations. The annual inundations of the Nile are due to the monsoon rainfall on the great mountains of Abyssinia, which increases the discharge at Assuan to 15 times the amount of the river at its lowest. The Orinoco is another instance of seasonal rains producing tremendous inundations, over 40,000 square miles of Llanos being said to be laid under water by the summer rains. The Amazon is an instance of a river which is always more or less in flood as the various tributaries attain their greatest height at different seasons. In June, when the highest level occurs in the main river, 20 or 30 miles of forest on each side of its banks are laid under water for hundreds of miles. The Ganges overflows its banks in summer when the monsoon rainfall is reinforced by the melting of snow on the Himalayas. Where the seasons of maximum rainfall and of snow-melting are different, as in the Mississippi, the Tigris, and Euphrates, there are two regular floods in the year.

The danger of flooded rivers arises from the suddenness with which the water rises and overflows narrow valleys or even plains. Frightful devastation follows the bursting of glacier obstruction lakes in mountain valleys. The great rivers of Siberia remain frozen at the mouths long after the ice and snow have been melted in the interior, and broad strips on their margins are necessarily laid under water by the natural outflow being stopped. The most serious floods in the Danube and Theiss have resulted from the constriction of the channel at the Iron Gates, which prevents the flood water

River

from passing away as rapidly as it comes down; the current of the Theiss is sometimes reversed for many miles. The widening of the channel has been repeatedly attempted as a remedy by increasing the outlet; and an elaborate system for regulating the river here, to be completed in 1895, was begun in 1890. In other cases, such as the tributaries of the Loire and the S. rivers of the Argentine Republic, the melting snow swells the torrential track, and, on account of the abrupt change of level and the flatness of the plain, the lower part of the rivers cannot carry away the immense volume of water rapidly enough, and floods result. In some instances torrential rivers have been successfully diverted into lakes, which regulate their outflow, preventing either dangerously high or extremely low water. Great rivers which have embanked their course above the level of the plain are the most dangerous of all when flooded. The damage caused by the bursting of the levees on the lower Mississippi necessitates a great expenditure in strengthening the embankments, and the most disastrous inundations recorded in history have followed the bursting of the banks of the Hoang-ho and its consequent changes of course.

River water is spoken of as fresh, but it always contains a certain amount of solid matter in solution, varying from two grains in the gallon or less in rivers draining hard crystalline rocks to 50 grains in the gallon or more in limestone districts. The nature of the salts dissolved naturally differs according to the geological character of the country traversed, but all samples of river water differ from sea water in containing a much smaller proportion of chlorides, and a very much larger proportion of carbonates and of silica.

The temperature of rivers as a rule follows that of the air, but is subject to variations on account of the effect of rain. During sudden floods in summer the temperature of the water may fall many degrees in a few hours as the melted snow or hail precipitated on the lofty mountains is carried toward the sea.

The great rivers of Europe and Asia, such as the Rhine, Danube, Volga, Indus, Ganges, Brahmaputra, Yang-tse-kiang, afford access to the sea to enormous populations. The Amazon, with its plain track extending for nearly 3,000 miles, is in many ways less like a river than a fresh inland sea; but the Mississippi and St. Lawrence, though less extensive, are of greater value for carrying sea traffic to inland places. In their torrential and upper valley tracks rivers are of use chiefly for transporting timber and driving machinery. It is interesting to note that in Switzerland, Norway, and Sweden, where there is no coal, there exist exceptional facilities for the use of

River

water power on account of numerous mountain torrents. In hot countries rivers are of the utmost service in irrigating agricultural land; the Zerafshan and Murghab are entirely consumed in that service, and since the completion in 1890 of the barrage on the Nile no water escapes to the Mediterranean in the low Nile months except along irrigation canals.

THE LARGEST RIVER-SYSTEMS.

River.	Area of Basin, square miles	Length, miles.	Annual Rainfall of Basin, cubic miles.	Mean Annual Discharge, cubic miles.
Amazon	2,230,000	3,400	2,834	528.0
Kongo	1,540,000	2,600	1,214	419.0
Nile	1,290,000	3,700	892	24.3
Mississippi	1,290,000	4,100	673	126.0
Niger	1,060,000	2,600	.....	.....
Ob	1,190,000	3,200	.....	.....
La Plata	995,000	2,300	905	189.0
Lena	942,000	2,900	.....	.....
Yang-tse-kiang....	880,000	3,200	.....	.....
Yenisei	689,000	3,200	409	125.0
Mackenzie	607,000	2,300	.....	.....
Volga	592,000	2,200	152	43.7
Ganges and Brahmaputra	588,000	1,800	549	43.3
Zambesi	570,000	1,600	.....	.....
St. Lawrence....	565,000	2,400	339	87.3
Winnipeg-Nelson.	504,000	1,500	.....	.....
Yukon	433,000	2,200	.....	.....
Orinoco	430,000	1,400	603	122.2
Amur	403,000	2,800	.....	.....
Hoang-ho	387,000	2,500	118	28.6
Indus	360,000	1,900	104	26.0
Danube	320,000	1,700	199	67.5
Murray	300,900	1,500	.....	.....

Rivers in Law.—A distinction is made between public navigable rivers and private fresh-water rivers. Where the tide ebbs and flows, the ownership of the bed is in the crown for behoof of the public, and, consequently, the crown is entitled to deepen the channel or perform any other operation on the *alveus* that may improve the navigation. The banks, however, beyond the foreshore are the private property of the riparian owner. It is settled in England—and an opinion to the same effect has been delivered in Scotland—that the public have no common law right to set up even a towing path along the bank of a navigable river; but, of course, such a privilege of roadway along a public waterway may be established by prescriptive possession. Above the flow and reflow of the tide all rivers and streams are *prima facie* private, though, either by immemorial uses or by act of Parliament, many have become subject to public rights of navigation. In the case of private rivers the *alveus* belongs to the proprietor through whose ground the river runs; or, if the river separates the lands of two owners, each is owner of the soil of the bed to the middle of the stream. The waters of a stream passing through or

River

between the lands of different proprietors may be subject to two kinds of rights, natural and acquired. Natural or proprietary rights are those possessed by every riparian proprietor; they consist principally of a right to a reasonable use of the water while it is flowing past his land, and a right to have the water flow in its accustomed manner without sensible disturbance or diminution by the superior or inferior riparian proprietors. Thus, though each proprietor may employ the water while it is within his own grounds, he must allow it to pass onward to the inferior proprietors in its original channel, and cannot alter its level either where it enters or leaves his property. The riparian proprietor, either in a public or private river, may protect his side of the stream by embankments; but such embankment must be constructed only for defense, and not in such a manner as to throw the force of the current on the opposite bank. Acquired rights, on the other hand, are those easements which entitle a riparian proprietor to interfere with a natural stream of water to an extent not justified by his natural or proprietary rights — by diminishing or obstructing the flow of water, by polluting it, etc. Such acquired rights in respect of water may exist in the inhabitants of a district by virtue of immemorial custom, and, both as to kind and extent, are regulated wholly by prescriptive use.

The pollution of rivers has of late years, in consequence of the extension of manufactures, caused serious concern. No person has a right to poison or pollute a stream, and if he do so any of the persons whose lands abut on the stream lower down may bring an action to recover damages. While, however, this right to object to an existing nuisance may be excluded by acquiescence or by prescription, it is so excluded only to the extent of the actual use or possession, and any material increase of the pollution or annoyance may be challenged and interdicted by the injured parties. At common law, indeed, in every question of river pollution, the real question of fact is whether there has been any material increase of pollution beyond that which is natural to the particular stream, or beyond that which has existed there for the prescriptive period. Questions of river pollution are eminently fitted for submission to a jury, and are generally disposed of in that way. The whole circumstances must be considered; for example, the size and character of the stream, the uses to which it can be and is applied, the nature and importance of the use claimed and exercised by one party, as well as the inconvenience or injury to the other party. In England, where the pollution of a stream amounts to a public nuisance, the party causing it may

River Tortoise

be prosecuted by indictment or proceeded against by information at the suit of the attorney-general. All the chief modern sanitary acts have provisions regarding the pollution of water; but most of them are local or deal with the pollution of water used for special purposes. In 1868 a Royal Commission was appointed to consider the question of river pollution, and its recommendations were followed in 1876 by the Rivers Pollution Act, which is applicable to both Scotland and England.

In the United States the common law of England was at first followed; but in some of the States it is expressly declared that the common law is inapplicable. Mining rights have been specially determined in some districts; and the laws as to irrigation rights have been elaborately defined in Colorado and elsewhere.

River Crab, a name given to a genus of crabs (*Thelphusa*), inhabiting fresh water, and having the carapace quadrilateral and the antennæ very short. One species (*T. depressa*) inhabits muddy lakes and slow rivers in the S. of Europe.

River Hog, the name occasionally given to the capybara.

River Horse, a name sometimes given to the HIPPOPOTAMUS (*q. v.*).

Riverside, a city and county-seat of Riverside co., Cal.; on the Santa Ana river, and on the Southern California railroad; 118 miles N. W. of San Diego. Here are a high school, two libraries, several National and State banks, and a number of daily and weekly newspapers. The city is in a fruit-growing section noted for its oranges, lemons and raisins, and has extensive irrigating canals. The assessed property valuation exceeds \$5,500,000. Pop. (1900) 7,973 (1910) 15,212.

River Terrace, a terrace along the side of a river. There is a steep cliff a few yards high supporting a flat terrace, corresponding in appearance to the adjacent alluvial plain. The terrace is apparently horizontal, but really has a slope corresponding to that of the river. Sometimes two or three such terraces exist one above the other. They are produced by the slow and intermittent upheaval of the land.

River Tortoise, a name of a family of tortoises that are aquatic in their habits, coming to shore only to deposit their eggs. They are exclusively carnivorous, subsisting on fishes, reptiles, birds, etc. The edges of the mandible are so sharp and firm that they easily snap off a man's finger. Well-known species are the soft shelled turtle (*Trionyx ferox*) and the large and fierce snapping turtle (*Chelydra serpentina*) of the United States. They inhabit almost every river and lake in the warmer regions in the Old and New Worlds, and are partic-

Rives

ularly plentiful in the Ganges, where they prey on human bodies.

Rives, Alfred Landon, an American engineer; born in Paris, France, March 25, 1830; studied at the University of Virginia; was graduated at the Ecole des Ponts et Chaussees, Paris, in 1854; was assistant engineer on the completion of the National Capitol, Washington; engineer in the construction of the aqueduct in Washington; and was in charge of the United States survey for improving the Potomac river. During the Civil War he was colonel of engineers in the Confederate army. After the war he was at different times an engineer on several railroads; and general manager and superintendent of many engineering works; and subsequently became chief engineer of the Cape Cod Canal. Died 1903.

Rives, Amelie, an American novelist; born in Richmond, Va., Aug. 23, 1863. At an early age she contributed short stories to magazines and newspapers. A series of stories composed her first book, "A Brother to Dragons." "The Quick and the Dead," a unique type of fiction first published serially, in "Lippincott's Magazine," in 1890, was her first success. It was afterward published in book form. "According to St. John" first appeared in the "Cosmopolitan" magazine, and then in book form, in 1891. Other books by this author are "Virginia of Virginia," and "Athelwold." She became the wife of John A. Chanler in 1888. They were divorced on account of incompatibility. In 1896 she married the son of a Russian Prince, Pierre Troubetskoi, an artist. She also wrote, "Herod and Mariamne"; "Witness of the Sun"; "Barbara Dering"; "Tanis"; etc.

Rivet, a short bolt with a flat or rose head, employed for uniting two plates or thin pieces of material. The stub end is swaged to prevent its withdrawal. When used for joining pieces of leather, as in making belting, an annular disk, termed a burr, is placed over this end previous to swaging, in order to give a greater bearing. Rivets are cut from round metal rods and formed by special machinery. In riveting iron plates together, as in boilers, tanks, etc., the rivet is made red-hot, and while a sledge is held against the head, the end is swaged down by striking directly with a riveting hammer, or a species of die called a snaphead is interposed. In riveting together wooden surfaces they may be lined with metallic plate, or washers may be placed under the head and the swaged burr, to prevent the indentation of the wood.

Rivet, Gustave, a French author; born in Domène (Isère), Jan. 25, 1848. He wrote a number of dramas, some of which appeared on the French stage. His writings include: "Lost Voices" (1874),

Rixey

poems; "Victor Hugo at Home" (1878); "The Punishment" (1879), a drama; "Marie Touchet" (1881), a drama; and "The Quest of Paternity" (1890).

Riviere (ri-vēr'), **Briton**, an English painter; born in London, England, Aug. 14, 1840. He studied art under his father, a drawing master at Cheltenham and Oxford, and was an Oxford graduate. He exhibited at the Royal Academy after 1864; elected A. R. A. in 1878, and R. A. in 1881. Among his chief pictures, many of which have been engraved, are: "Strayed from the Flock," "The Lost Sheep," "Legend of St. Patrick," "An Anxious Moment," "Circe," "Giants at Play," "Actæon," "Væ Victis," "Rizpah," "A Fool and His Folly," etc.

Rivière, Henri-Laurent, a French author; born in Paris, France, July 12, 1827. He acquired a speedy popularity by two simple tales, "Pierrot" (1860), and "Cain" (1870). He afterward produced many stories, comedies, and works of a more serious character, among them being: "The French Navy under Louis XV." (1859); "The Possessed One" (1863); "The Journal of a Marine" (1866); "The Upstart" (1869); "Adventures of Three Friars" (1875); "M. Margerie" (1875); and "The New Caledonia" (1880). He was killed in Anam, May 20, 1883.

Rivoli, a town of Northern Italy, 8 miles W. of Turin, with two royal castles and some industry. It was not near this place, but near another, Rivoli, 12 miles N. W. of Verona, that Napoleon won on Jan. 14 and 15, 1797, one of his most decisive victories over the Austrians.

Rivotite, a very compact amorphous mineral of a yellowish to grayish-green color. Hardness, 3.5-4; sp. gr., 3.55-3.62; fracture uneven, fragile. An analysis yielded: Antimonic acid, 42.0; protoxide of silver, 1.18; protoxide of copper, 39.50; carbonic acid, 21.0; lime, a trace, from which the formula $2\text{SbO}_3 + 4(\text{CuO}, \text{AgO})\text{CO}_2$ is calculated.

Rixey, Presley Marion, an American physician; born in Culpeper co., Va., July 14, 1852; was graduated at the University of Virginia in 1873; appointed an assistant surgeon in the navy, Jan. 28, 1874; and served at home and on European stations till 1888, when he was promoted surgeon. He became the physician of President McKinley and his family; attended Mrs. McKinley in her severe illness in San Francisco in the summer of 1901; and was with the President in Buffalo, N. Y., from the time he was shot, Sept. 6, till his death, Sept. 14, 1901. In accordance with the intention of President McKinley, Dr. Rixey was appointed by President Roosevelt surgeon-general of the navy, with the rank of

rear-admiral, Jan. 21, 1902, to succeed Rear-Admiral William K. Van Reypen, retired.

Rizal, José, a Filipino patriot; born in Catamba, Luzon, in 1861. He was the son of unmixed Tagal parents, who destined him for the Church. He received his early education in his native town under the tutorship of P. Leontio, a Tagal priest. Later he was sent to Manila, where he entered the Ateneo Municipal, a school in charge of the Jesuits. At this time José assumed the name of Rizal, as his brother's friendship for a revolutionist priest had brought the family name, Mercado, into great disfavor with the Spaniards. In Manila José soon learned of the reproach attached to his Tagal origin. He was denied the honors due him as head of his class; and his patriotic poems and speeches met only the derision and hatred of the Spanish students. In many ways his prejudices against the Spanish were roused, but he later subdued them on the ground of "long existing unjust conditions" which had perpetuated injustice on the Spanish nature. Though he had been destined for the Church, he studied for and took his medical degree at Manila. Then he went to Paris, Heidelberg, Leipsic, and in all these cities he continued his medical studies. At the same time he developed his interest in social and political problems. He learned that Europe was almost ignorant of the Philippines, so he wrote a novel, portraying his birthland, which was published in Berlin in 1887. This book was forbidden by the Church. He wrote a sequel to it which was published at Ghent in 1891. He was a sympathetic poet, a political author, and a sculptor. His portrait-bust of the Filipino-Creole, Dr. T. H. Pardo, was exhibited in the Salon. In 1887 Rizal went to Hong Kong where he organized the famous Liga Filipino, or Philippine League, which was the source of the "Revolutionary Society of the Sons of the Nation." During several years of travel he constantly agitated Filipino revolt, and then in May, 1892, returned to Manila. He was arrested and exiled to Dapitan, in one of the S. islands. In 1895 he was permitted to return to Luzon. He was, however, arrested at Barcelona and transshipped to Manila, tried and condemned to death. His last wishes, that he might be united by civil marriage with Miss Josephine Bracken, whom he first met in Hong Kong, and who had gone to Manila when his trial begun; and the other, that he should be shot through the breast, were granted. He was shot by a picket of native soldiers, Dec. 30, 1896, and his last words were, "Consummatus est!"

Rizzio, David, a native of Turin, came to Scotland in 1564 in the train of the ambassador from Savoy, and soon became so great a favorite with the queen that he was

appointed her secretary for foreign languages. The distinction with which he was treated by his mistress soon excited the envy of the nobles and the jealousy of Darnley. A conspiracy, with the king at the head, was formed for his destruction, and before he had enjoyed two years of court favor Lord Ruthven and others of his party were introduced by Darnley into the queen's apartment, where they dispatched the object of their revenge March 9, 1566. Popular tradition assigns to Rizzio the improvement of the Scottish style of music.

Roach, John, an American shipbuilder; born in Mitchelstown, Ireland, in 1815; came to the United States in 1829; and secured employment in the Howell Iron Works in New Jersey. Subsequently he established a foundry in New York city, and erected the Ætna Iron Works, where he built the first compound engines ever made in the United States. In 1871 he purchased the shipyards in Chester, Pa., and under the name of the Delaware River Iron Shipbuilding and Engine Works enlarged them till their value was estimated at \$2,000,000. Here, besides a large number of vessels for the merchant service, he built the first ships of the new United States navy, including the cruisers "Atlanta," "Boston," and "Chicago," and the dispatch-boat "Dolphin." The refusal of the Navy Department to accept the "Dolphin" forced him to close up his shipyards in 1885. He died, in grief over his treatment, in New York city, Jan. 10, 1887.

Roads, Making of by Machinery. The immense number of crude and frequently impassable roads to be found in all parts of the United States and the serious extent to which they have handicapped the marketing of farm products in various sections of the country lend especial significance to the crusade in favor of good roads which is being conducted by the Office of Road Inquiry, a division of the Department of Agriculture. As yet there have not been secured appropriations of sufficient size to enable the government to undertake on its own account the provision of better highways, but this will come in time, and meanwhile highly important results are being accomplished solely by the presentation of forceful object lessons.

The investigations of the Office of Road Inquiry are mainly directed in seven general fields, namely: To ascertain as nearly as practicable the actual cost of bad roads and the benefit of good roads; to demonstrate the interest of cities and towns and the owners of property of all kinds wherever situated, in the improvement of country roads; to develop the methods whereby all of these interests may coöperate with the farmers in the work of road improvement; to discover what actual and sys-

tematic road improvement is being carried on in any part of the United States, and how the same or modified methods may be applied to other sections; to discover road materials in various sections of the country; to discuss new plans for road construction, and encourage experiment in this direction, and, finally, to actually construct sample roads.

The governmental experts have incidentally devoted much attention to the subject of wide tires; have investigated the use of convict labor in road construction, and encouraged the organization of State and local road associations. In this connection many important experiments have been made to test the power required in hauling over various kinds of roads. The government has learned too, by consultation with many thousands of the most intelligent farmers of the country that the expense of moving farm products and supplies averages on all the American country roads 25 cents per ton mile, whereas the charge in the good road districts of this and other countries is less than one-third that amount. This extra expense amounts in the aggregate to more than the entire expenditures of the national government, and taking into account all of the hauling done on the public roads the loss is equal to one-fourth of the home value of all the farm products of the United States.

Probably the most interesting phase of the work has been found, however, in the construction of specimen roads of various kinds in different parts of the country. Ordinarily three styles of road have been represented in this experimental work—a modern macadam, a sand, and a dirt road. Of these three the macadam highway is the most interesting from the point of construction. After a uniform grade has been secured by the use of wheeled scrapers, drag scrapers, and plows, and possibly road graders as well, there are placed on this foundation three separate layers of the best quality of stone that is procurable in the vicinity. The foundation course, which is about five inches in thickness and made up of 2½-inch stone, is thoroughly rolled before the second course, composed of 1½-inch stone, is put on, and this layer in turn is sprinkled and rolled before the surface layer or “binder,” as it is commonly called, consisting of ¾-inch stone and dust, is put in place.

The sand road is formed by placing six inches of river sand on a bed of natural clay, neither the bed nor the surface of the road being rolled. The dirt road is made by grading in the usual manner. As a rule neither of these latter classes of highways is constructed save to demonstrate the superiority of the macadam road. Considerable attention has been given to the construction of steel-track wagon roads—

decidedly the most novel type of highway yet introduced in any country. The steel road might be compared to a street car track of modified design, and the plan for its utilization was doubtless suggested by the well-known tendency of teamsters to make use of urban and interurban trolley and cable lines on highways where locomotion would otherwise be difficult.

The steel-track wagon road consists of two parallel lines of steel plates or rails each eight inches in width and not supported on wooden cross-ties, but simply made solid in the road by flanges projecting into the concrete of the roadbed. The rails are accurately spaced so as to receive the wheels of all vehicles of standard gauge without regard to the width of tire, and each plate or rail is fitted with a flange on the inner side to prevent wheels from easily leaving the tracks. Unique roads of this type have been constructed in half a dozen different States, and in some instances the records made on them have been little short of marvelous. In one instance a load of 11 tons which required 20 horses for its movement over an ordinary road was readily drawn along the steel track by a single horse. This load was 22 times the weight of the animal, but at Ames, Ia., recently a horse started and moved on a steel-track highway a load 50 times the weight of the animal. It may be noted that the cost of the steel-track roads has ranged from \$1,500 to \$3,500 a mile, according to the original condition of the roadbed.

The extension of the good roads movement has resulted in a corresponding development of the engineering operations involved and of the machinery employed. Possibly the most interesting of all the forms of special apparatus which have been introduced for this work is the elevating grader which is utilized in reducing cuts several feet in depth. This machine elevates earth and drops it into wagons alongside, loading a wagon in 20 seconds. On an average such a machine will load into wagons in one day of 10 working hours from 700 to 800 yards of earth.

The elevating grader is very heavy, and about 12 horses are required for its movement, some of the animals pulling and others pushing. The operating force consists of three drivers and two machine operators, one of the latter looking after the plow and the other giving attention to the elevating conveyor. The plow of this machine makes a cut 12 inches square. After a grade has been reduced a machine of this type may be employed if desired to elevate dirt to the center of the road, from whence it is distributed by graders of the ordinary type.

The construction of macadam roads on a large scale has naturally imparted a great impetus to the development of rock crush-

ing apparatus. The first steel rock-crusher was built 10 years ago and a gradual improvement has since gone hand in hand with an increase of capacity. The most modern plants not only crush the stone, but elevate it and separate it into sizes. The stone crushers weigh from two to eight tons each, require for their operation engines of from 12 to 25 horsepower, and give a product of from 8 to 30 tons of crushed stone per hour. For separating the crushed stone into different sizes, road makers usually use a portable storage bin, which weighs 2,500 pounds and has three compartments, each of which will hold four tons of stone and which are provided with discharging chutes on either side so that wagons can load from both sides if necessary. For separating the crushed material into various sizes screens of different types are available. One of the most interesting forms of this apparatus is the revolving screen, which revolves on either a shaft or on rollers and into which the stone passes. Some of these screens are 56 inches in diameter, and inasmuch as each screen is punched with holes of two different sizes, three different sizes of product are obtained, one size passing through the one-inch holes, a second size passing through the two-inch holes, and the largest size passing out at the end of the screen.

Another class of machine in which great improvement is noticeable is the steam road rollers. The principle on which the newest machines are constructed is to make the wheels, which are absolutely necessary to carry the machine, act as the rollers proper. Road rollers range in weight from 5 to 19 tons, and on the larger sizes the driving wheels are about 76 inches in diameter and have a facial measurement of from 20 to 26 inches. Rapid road building is still further facilitated by the use of spreading wagons, dump wagons, road plows, and other improved forms of apparatus which are largely automatic in their operation and which contribute to an economy of time and money.

The advocates of good roads will find plenty of arguments in the recent report of the Industrial Commission on the marketing and distribution of farming products. This report shows the value of good country roads and the immense saving that could be effected through them. It also furnishes arguments in favor of the construction of electric lines through the farming sections of the country, not only for the hauling of passengers, but for the hauling of freight.

The report shows that the cost of hauling farm products over country roads is \$900,000,000 a year, or more than the entire cost of operating all the railways in the United States. The total operating expenses of railroads is estimated at only

\$818,000,000 annually. The average haul to the nearest shipping station in the transportation of farm products is 12 miles, and the average cost is 25 cents a ton per mile, or \$3 a ton for the 12 miles. By comparing this ton mile cost with the average ton mile revenue of the railroads in the country, which amounts to seven mills per mile, the immense opportunity for saving that would be effected through good roads may readily be seen. If farm products could be hauled to market at seven mills per ton mile, as is the case with railway traffic, the entire charge for transportation would be less than \$26,000,000, as compared with the \$900,000,000 it costs the farmers to haul their products over ordinary roads.

The building of good roads and the construction of electric lines will mean an enormous saving to the farming classes. Some of the advocates of good roads believe that the two could be constructed jointly, as the cost would be proportionately less for the building of good wagon roads, which would also be used for electric railways. These electric railways could be constructed through those sections of the farming community which would offer the best possibilities in the way of freight and passenger traffic returns, and wagon roads could be built connecting these with all sections of the country. The farmer who did not live on the direct line of an electric railway could haul his freight to the nearest point where it could be quickly transferred to an electric train.

The Good Roads Train.—The National Good Roads Association, assisted by Director Martin Dodge, director of the government Bureau of Public Roads Inquiries, and various individuals interested in the improvement of our public highways, has given the people of the Middle West and South a very practical object lesson in the construction and the value of good roads. They have built improved highways at the very doors of the people in a number of communities in the Mississippi valley, showing them by actual example how to make fine modern highways out of the materials which they have at hand.

It has been an object lesson with possible practical results. They brought nothing which the people themselves might not have, using only the raw material which the local community already had. And they created in many places a desire for something better by an example of it.

The "good roads" train is the novel and effective means of imparting this instruction. It has already made its first trip, and the enthusiasm with which it was received points to the success of the plan. It is likely to be made a permanent feature of instruction in making good roads. Other trains like it will be sent through other parts of the country. On this initial trip

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the men in charge of the train have received more requests than they can comply with to give exhibitions of road making.

The idea of the train originated in the Good Roads Convention held in Chicago in November, 1900. At that time it was hoped that Congress would make a considerable appropriation for the building of specimen highways in different parts of the country. Congress did increase the appropriation for the Bureau of Public Road Inquiries of which Mr. Dodge of Ohio has been in charge for several years, but it did not appropriate money for actual road building; but the Good Roads Association decided on concerted private effort to accomplish the same end in a way quiet and yet effective.

It was thus that the "good roads" train was hit upon. The manufacturers of road-building apparatus contributed the use of the best machinery and men to operate it. The Illinois Central Railroad Company offered the train. Early spring is a more favorable time for work in the Southern than in the Northern States, and New Orleans was made the starting point. The train left Chicago for New Orleans on April 20, 1901. The place selected to give the first object lesson in scientific road building was Carrollton avenue, in a suburb of New Orleans. It was hardly worthy to be called a street. It ran through very low ground, no attempt had ever been made to grade it and it was practically impassable for the greater portion of the year. It was decided to build a dirt road using only the material at hand—a lumpy clay baked almost to the solidity of stone by the heat of the sun.

This was the soil on which the men and machinery of the good roads train were put to work. A 16-mule team was hitched to the principal machine and it tore through the sun-baked soil, plowing up a broad furrow from the side of the street, throwing it on a conveyor which in turn deposited it on the middle of the roadway. Under the unfavorable conditions encountered the machine moved more than 100 yards of earth per hour and did the work of more than 50 men with teams, plows, and scrapers.

Behind this road builder came harrows to break up and evenly distribute the earth; graders to round it off so as to insure proper drainage, and rollers to press it down. At the end of two days the city had a fine stretch of well built comparatively waterproof road a mile in length in place of the impassable "avenue."

The city officials gave their hearty co-operation, and furnished prison labor and 16 mule teams with drivers. The achievement was viewed with astonishment by the citizens of New Orleans, who had come to consider this particular portion of their street system as hopeless. No crushed

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rocks, shells, or other foreign materials were used in making this road, and it is not regarded by the government experts in charge as being by any means an ideal highway. But it is interesting and highly instructive as showing what may be accomplished with the most accessible material.

The train remained in New Orleans during the Good Roads Convention which was held there on April 29 and 30, 1901. It then went on its way back toward Chicago, stopping at frequent intervals to give the residents of Mississippi, Tennessee, Kentucky, and Illinois practical lessons.

"This subject has been agitated for years," says Mr. Dodge. "Reports and pamphlets have been issued, conventions have been held, and the government, through the Public Roads Inquiries Bureau, which is part of the Department of Agriculture, has examined soils, given instructions in the methods of road building, answered questions, experimented, and done everything possible within the limited scope marked out for it to assist in spreading knowledge and creating sentiment in regard to this important subject. Last year, in connection with local authorities, we constructed some short sample pieces of roadway at Port Huron, Mich., Springfield, O., Topeka, Kan., and one or two other places. I found then, as we are proving again now in connection with this 'good roads' train, that more people will flock to see the actual construction and operation of a model road than will go to a convention and hear the subject discussed by the highest authorities who can speak on it.

"In this fact I believe is to be found the cue for our future operations. If a strip of thoroughly good roadway only a quarter of a mile long could be laid in every township of the country to show the people what modern methods and machinery can accomplish with the least promising materials, it would prove a mighty leverage in doing away with the disgraceful conditions of the roads in a great part of the country. Taking an average of the whole country it is true, undoubtedly, that it costs more to haul the products of the soil 15 miles by wagon than it does to convey them 250 miles by rail. The burden of this waste in time, labor, and money falls on the agricultural producer.

"So far as our work has extended in the South and West we find that people of all classes are taking a very lively interest in it. With the desire for better conditions firmly established, and the knowledge of methods and machinery which can be taught by practical illustration, it need be a matter of a few years only before our highways become a source of national pride instead of being, as they now are, in many parts of the country, a national disgrace."

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Roads, artificial pathways formed through a country for the accommodation of travelers and the carriage of commodities. Though the Romans set an example as roadbuilders, some of their public highways being yet serviceable, the roads throughout most of Europe were in a wretched condition till toward the end of the 18th century. France was in advance of other countries in road making; in England a decided improvement of the highways only began in the 19th century. The first important point to be considered in road making is the route to be followed, a matter in which natural obstructions and inequalities of level have to be taken into account, besides the question of directness of route, the deviations advisable in order to accommodate certain centers of population, the expense of maintenance, etc. Natural obstructions are overcome by special contrivances, such as bridges, embankments, tunnels, etc. When diversities of level are necessary, road engineers fix the degree of inclination at the lowest possible point. Telford estimated the maximum inclination of a road to be 1 in 24, but except in extreme cases it is considered better that it should not exceed 1 in 50. The angle of repose, or maximum slope on which a carriage will stand, has been estimated at 1 in 40. The width of the road is also a very important consideration as bearing both on the original cost and on the permanent maintenance. A properly constructed road, besides a foundation, consists of two layers, an upper and an under. After a good foundation is obtained the laying of a base, the best material being concrete of gravel and lime, gives durability to the road. On this base the actual roadway is laid with a slight inclination from the center to the sides for the purpose of drainage. Before the time of Macadam it was customary to use broken stones of different sizes to form the roadway, the consequence being that in course of time the smaller stones sank, making the road rough and dangerous. Macadam early in the 19th century (see MACADAM) introduced the principle of using stones of uniform size from top to bottom. The general superintendence of roadways is usually exercised by the government of a country, but it intrusts the execution of its enactments to local authorities. Highways are public roads which every citizen has a right to use. They are constituted by prescription, by act of legislature, or by dedication to the public use. What is known as the rule of the road is that in passing other horsemen or carriages, whether going in the same or the opposite direction, the rider or driver must pass on the left hand of the other rider or driver. Automobiles and bicycles are subject to the

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same restrictions and are entitled to the same privileges as ordinary vehicles.

Roads, Queen of. See QUEEN OF ROADS.

Roanoke, a city in Roanoke co., Va.; on the Roanoke river, and on the Norfolk and Western railroad; 53 miles W. of Lynchburg. It is in a section rich in iron mining and farming interests. Here are a high school, the Gilmer School for Young Ladies, Allegheny Institute, improved sewer system, waterworks, street railroad and electric light plants, National and State banks, several hotels, and daily, weekly, and monthly periodicals. It has large machine shops rolling mills, bottle works, tobacco factories, iron works, locomotive and car works, canning factories, spoke factories, saw and planing mills, coffee and spice mills, and many smaller industries, and an assessed property valuation of over \$10,000,000. Pop. (1890) 16,159; (1900) 21,495; (1910) 34,874.

Roanoke, a river of the United States, in Virginia and North Carolina. It flows chiefly S. E., and after a course of about 250 miles falls into Albemarle Sound. It is tidal for 75 miles and is navigable for double that distance for small vessels.

Roanoke College, an educational institution in Salem, Va.; founded in 1853, under the auspices of the Lutheran Church; has endowment funds exceeding \$135,000; grounds and buildings valued at over \$100,000; volumes in the library, about 24,000; scientific apparatus, etc., \$6,000; ordinary income, \$22,000; average number of faculty, 20; average student attendance, 190; graduates, over 625.

Roaring, in horses, a disease of the nerves and muscles of the larynx which causes an obstruction to the passage of air, giving rise, when the horse is briskly exercised, to the peculiar sound from which the disease derives its name. The cause of the disease is in most cases attributed to fatty degeneration and atrophy of the laryngeal nerve, which brings about an atrophy of the muscles of the larynx on the side affected, and thus causes the arytenoid cartilage to obstruct the passage. The disease generally affects the left side, and is not, as a rule, amenable to treatment. Several cases have been cured lately by excision of a portion of the affected arytenoid cartilage, and this operation promises to be very successful in this disease.

Roaring Forties, a sailor's term for a region of the great Southern Ocean lying S. of lat. 40° S. (especially S. of 45°), where the prevailing winds are strong W. N. W. and N. W. winds, often stormy. It is owing to these winds that the outward voyage to Australia is made by the Cape, and the homeward voyage by Cape Horn. The same name is sometimes given by anal-

ogy to a belt of the North Atlantic about 46°-50° N.

Roasting, the cooking of meat by the direct action of fire—that is, by dry heat, either before the fire or in an oven. Roasting before an open fire is considered preferable to roasting in an oven (which is analogous to baking), on account of the free ventilation to which it exposes the meat during the process. The apparatus in most kitchens for open roasting are a fire, a spit, a contrivance for turning the meat to present all sides of it alternately to the fire, a screen to economize the heat, and a saucepan to catch the dripping. The fire must be kept even and bright throughout. During the process of roasting, the meat should be basted with the dripping to keep it soft and allow the heat to penetrate. The speciality of roasting as compared with boiling is that it retains the saline ingredients of the meat. The time allowed for roasting is roughly estimated at a quarter of an hour to one pound of meat. Longer time is required in winter than in summer, and for new than old killed meat.

Robbery, the unlawful taking away of money or goods of any value from the person of another, or in his presence, either by violence or by putting him in fear. Hence, in order to constitute robbery, there must be: (1) An unlawful taking. (2) The thing must be of some value, but it is immaterial, as constituting the offense, whether it be a cent or a dollar. (3) The taking must be by force, or a previous putting in fear. It is this last which distinguishes robbery from other larcenies, and makes the violation of the person more atrocious than private stealing. The taking must also be either directly from the person or in his presence, or it is not robbery. The thing taken must have been in the possession of the thief, and if he once has it in his possession, even though he immediately restore it, he is still guilty of robbery. In the United States robbery is punishable according to the laws of the various States.

Robbia, Luca della, an Italian sculptor; born in Florence in 1399 or 1400. He designed and executed between 1431 and 1440 10 panels of "Angels and Dancing Boys" for the cathedral, which Prof. J. H. Middleton calls one of the greatest pieces of sculptured work in the 15th century. Another great work by him was a bronze door, with 10 panels of figures in relief, for the sacristy of the cathedral, made between 1448 and 1467. In marble he sculptured, in 1457-1458, the tomb of Federighi, Bishop of Fiesole (now in the church of San Francesco outside the city). The frame that surrounds this monument is made of exquisitely painted majolica tiles. His name is closely associated with the pro-

duction of figures in glazed or enamelled terra-cotta, made by a process which, though he did not invent it, he yet perfected greatly. Among the works he executed by this process are numerous medallions, some white, some polychrome, and reliefs. He died in Florence, Feb. 20, 1482. His principal pupil was his nephew ANDREA (1435-1525), who worked chiefly at the production of enamelled reliefs, retables, and medallions, these last for the most part productions of the "Madonna and Child." Nearly all his works were of religious subjects; they were made chiefly for Florence, Arezzo, and Prato. His son GIOVANNI (1469-1529?) continued the activity of the family in this style of work; his best productions are the frieze, representing the "Seven Works of Mercy," outside a hospital at Pistoja, and a fountain in the sacristy of St. Maria Novella in Florence.

Robbins, Francis Le Baron, an American clergyman; born in Camillus, N. Y., May 2, 1830; was graduated at Williams College in 1854; held pastorates in Philadelphia for 25 years; founded the Oxford Presbyterian and Beacon Churches, the latter an institutional church among the working class of the Kensington district of Philadelphia.

Robert, Duke of Normandy, surnamed THE DEVIL; the younger son of Duke Richard II. by his marriage with Judith, a daughter of Count Godfrey of Brittany. In 1027 he succeeded his elder brother, Richard III., whom he is charged with having poisoned. The first years of his government were employed in bringing his rebellious vassals into subjection, and he then restored Count Baldwin of Flanders to his states, assisted Henry I., King of France, against his mother Constantia, and humbled Count Otho of Champagne. In 1034 his fleet was wrecked off Jersey while on its way to England to support his nephews Alfred and Edward against Canute, who had excluded them from the succession to the English throne. Hereupon he concluded a truce with Canute, by which the two princes were promised half of England. In 1033 he set out to visit the holy places, and subsequently made the pilgrimage to Jerusalem on foot. While returning he died suddenly in Nicæa in Asia Minor (1035), and is supposed to have been poisoned by his servants. His heroic deeds and penance have given rise to numerous stories. William the Conqueror was his son.

Robert I. See BRUCE, ROBERT.

Robert II., King of Scotland; born in Scotland, March 2, 1316; the son of Marjory, daughter of Robert Bruce, and of Walter, steward of Scotland, and was thus the first of the Stewart or Stuart kings. He

was recognized by Parliament in 1318 as heir to the crown. On the death of David II. he was crowned at Scone, March 26, 1371. He had long acted as regent, and had done good service in the English wars. An act of Parliament in 1375 settled the crown on his sons by his first wife Elizabeth Mure of Rowallan, illegitimate by ecclesiastical law. His reign was comparatively a peaceful one, one of the chief events being the battle of Otterburn. He died in Dundonald Castle, May 13, 1390.

Robert III., King of Scotland, eldest son of the preceding; born in 1340 and was originally called John, but changed his name on his coronation in 1390. Having been lamed by accident, he was unable to engage in military pursuits, and he trusted the management of affairs almost entirely to his brother, whom he created Duke of Albany. In 1398 Albany was compelled to resign his office by a party who wished to confer it on the king's eldest son, David, Duke of Rothesay. War was renewed with England, and the battle of Homildon Hill, Sept. 14, 1402, resulted in a disastrous defeat of the Scotch. In this year the Duke of Rothesay died in Falkland Castle, where he had been imprisoned; and it was commonly believed that he was starved to death at the instigation of Albany. Dread of Albany, who had recovered the regency, induced the king to send his second son, James, to France in 1406; but the vessel which carried him was captured by the English, and Henry IV. long detained him as a prisoner. Soon after this event Robert died in Rothesay, Bute, in 1406.

Robert College, a Christian institution of learning in Hissur, a suburb of Constantinople, founded in 1863 by Christopher R. Robert, a wealthy resident of New York. The Rev. Cyrus Hamlin, D. D., was its first president. Mr. Robert supported the institution till his death in 1878, and then bequeathed to it one-fifth of his estate. His gifts to the institution amounted in all to about \$450,000. The college was incorporated as a branch of the University of New York in 1864. The permission to erect suitable buildings was given by the Sultan in 1869. The two main buildings were erected respectively in 1871 and 1893. The course of study is similar to that of an American college, with special stress laid on the teaching of English. There is a preparatory course of five years. Dr. Hamlin resigned the presidency in 1877, and was succeeded by Rev. George Washburn, D. D.

Robert, Henry Martyn, an American military engineer; born in Robertsville, S. C., May 2, 1837; was graduated at the United States Military Academy in 1857; served on frontier duty in 1858-1861; was on the staff of General McClellan and on duty as engineer during

the Civil War; was promoted captain in 1863. He was assigned to duty in connection with the fortifications and river and harbor improvements in 1867, and was promoted colonel and made president of the Board of Engineers for Fortifications in 1895. He is the author of the well-known "Robert's Rules of Order" (1876).

Robert of Gloucester, an English chronicler, living at the time of the battle of Evesham (1265). He is remarkable for a metrical chronicle of England, from the time of the fabulous Brutus to his own, based chiefly upon Goeffrey of Monmouth's book. It extends to 10,000 lines, and is one of the earliest epics of the English language. It was printed by Thomas Hearne in 1724.

Roberts, Brigham Henry, an American journalist; born in Warrington, Lancashire, England, March 13, 1857. In the summer of 1866 he emigrated with his parents to Davis co., Ut. At 17 he was apprenticed to the blacksmith trade, at which he worked four years; subsequently attended the University of Utah. Soon after his graduation he was called by the Mormon Church to its missionary service. After laboring for some years as a missionary he was elected to a high office in the Church. He also engaged in journalism and was for a time editor-in-chief of the Salt Lake "Herald." In 1894 he was elected to the State Constitutional Convention. At the first State election he was the nominee of the Democratic party for Representative to Congress, but was defeated. In 1898, however, he was elected by a large majority. His election created widespread agitation throughout the country, and on Jan. 25, 1900, the House of Representatives by an overwhelming majority voted to exclude him as constitutionally ineligible, as a polygamist, to a seat in that body.

Roberts, Charles George Douglas, a Canadian poet; born in Douglas, N. B., Jan. 10, 1860. He was an earnest advocate of Canadian nationalism, and such of his poetical compositions as relate to this and other distinctly Canadian subjects are particularly excellent. He published: "Orion, and Other Poems" (1880), and "In Divers Tones" (1887); and has edited "Poems of Wild Life" in the series of "Canterbury Poets" (1888). In 1897 appeared his "History of Canada"; in 1900 "By the Marshes of Minas"; and in 1901, "In the Heart of the Ancient Wood."

Roberts, David, an English painter; born in Edinburgh, Oct. 24, 1796, and was apprenticed to a house painter. In 1818 he advanced to the grade of scene painter, and in 1821 went to London to paint scenery for the stage of Drury Lane. All this while he was studying artistic drawing and

painting, and in 1826 and 1827 he attracted the attention of the public with pictures of Rouen and Amiens cathedrals in the Royal Academy exhibitions. Then for several years he traveled in Spain, Morocco, Egypt, Palestine, Italy, Belgium, making drawings of grand and impressive buildings and landscapes with picturesque edifices, and working them up into pictures. From among this work the following stand out—the drawings from Spain for the illustrations to the "Landscape Annual" (1835-1838); the magnificent volumes of "The Holy Land," "Syria," "Idumea," "Arabia," "Egypt," and "Nubia" (1842); numerous interiors of churches, as St. Miguel at Xeres, Holy Nativity at Bethlehem, St. Jean at Caen, St. Paul at Antwerp, St. Peter's at Rome, the cathedrals of Milan and Seville; and the grandiose pictures, "Departure of the Israelites from Egypt" (1829); "Ruins of the Great Temple at Karnac" (1845); "Jerusalem from the Southeast" (1845); "Destruction of Jerusalem" (1849); "Rome" (1855); and "Grand Canal at Venice" (1856). Roberts' style was essentially spectacular, producing grand broad effects, with magnificent architectural arrangements, to which the details are of course generally sacrificed.

Roberts, Ellis Henry, an American financier; born in Utica, N. Y., Sept. 30, 1827; was graduated at Yale University in 1850, and became editor and proprietor of the Utica "Morning Herald" in 1851. In 1866 he was elected to the New York Assembly, and in 1871-1875 was a member of Congress. He was assistant treasurer of the United States in 1889-1893; president of the Franklin National bank, New York city, in 1893-1897, and became treasurer of the United States in 1897.

Roberts, Frederick, Lord, an English military officer; the son of an Indian officer, Gen. Sir Abraham Roberts; born in Cawnpur, India, Sept. 30, 1832. He was brought to England when two years old, educated at Clifton, Eton, Sandhurst, and Addiscombe, and entered the Bengal Artillery in 1851. His first taste of actual warfare was got in the hot time of the siege of Delhi, during the mutiny, and he took an active part in the subsequent operations down to the relief of Lucknow, acting on the staff, in the quartermaster-general's department, and he won the V. C. He discharged the duties of assistant quartermaster-general in the Abyssinian expedition of 1868, and in the Lushai expedition of 1871-1872. On the outbreak of the Afghan war in 1878, Roberts, now Major-General, was appointed to command the Kurram division of the army. He forced in brilliant fashion the Afghan position on the

peak of Peiwar Kotul (8,500 feet above sea-level), and was rewarded with a knight-commandership of the Bath (1879). After the murder of Sir Louis Cavagnari and the escort of the British mission at Kabul, he was given command of the force sent to avenge them. He defeated the Afghans at Charásia on Oct. 6, took possession of Kabul on the 12th, and assumed the government of the country, Yákúb Khan having abdicated. Events followed quickly: the fortified cantonment of Sherpur was occupied by the British army, the fortress of Bala Hissar in Kabul was dismantled, Yákúb Khan was sent a prisoner to India, the Afghans began to concentrate on Kabul, General Roberts sought to check them, and there was much sharp fighting round the city, Abdurrahman was proclaimed Ameer, and General Burrows was crushingly defeated at Maiwand, and the British garrison of Kandahar besieged by the followers of Ayub Khan. On Aug. 9 Sir F. Roberts set out with 10,148 troops, 8,143 native followers, and 11,224 baggage animals on his memorable march through the heart of Afghanistan to the relief of Kandahar, which he reached three weeks later. He immediately gave battle to Ayub Khan and routed him completely, capturing all his artillery and his camp. When he visited England toward the close of the year he was honored with a baronetcy, and on his return to India was appointed Commander-in-Chief of the Madras army (1881), and held the rank of Commander-in-Chief in India 1885-1893. He was appointed Commander-in-Chief of the forces in Ireland in 1895; and in 1899 took command of the English forces in South Africa; capturing Cronjé, relieving Kimberly, and annexing the two republics. He returned to England and was made Commander-in-Chief to succeed Lord Wolseley.

Roberts, (Henry) Chalmers, an American journalist; born in Austin, Tex., July 31, 1870; was educated at private schools, and studied law at the University of Texas. After leaving college he engaged in journalism; went to the seat of the Turko-Grecian war as correspondent of the London "Daily News," and in the American-Spanish War was correspondent for the London "Daily Mail" and the Brooklyn "Eagle." After traveling in Egypt for "Harper's Magazine" in 1899, he went to London, England, where he became literary agent for Doubleday, Page & Co., of New York. He is the author of articles on political and social conditions in Egypt, and numerous sketches on art, biography, and travel.

Roberts, Margaret, a Welsh author; born in Honyngs, North Wales, in 1833. She has lived much in Italy, France, and Germany, and wrote her first book in Ital-

ian, with the exception of the last chapter. Most of her books have been published anonymously. They include: "Mademoiselle Mori" (1860); "Denise" (1863); "Madame Fontenoy" (1864); "On the Edge of the Storm" (1868); "Margaret Woodward" (1877); "Grammar of the French Language" (1882); "In the Olden Time" (1883); "Hester's Venture" (1886); "Under a Cloud" (1888); and many others.

Roberts, Samuel, an English author; born in Sheffield, England, April 18, 1763. He was known as the "Pauper's Advocate" and was the author of an immense number of books, pamphlets, and broadsheets, dealing with all that he considered unjust or tyrannical. His principal works are: "Tales of the Poor" (1813); "The Blind Man and His Son" (1816); "Defense of the Poor Laws" (1819); "Life of Queen Mary" (1822); "The Gypsies: Their Origin, Continuance, and Destination" (1836) and "Milton Unmasked" (1844). His "Autobiography and Select Remains" were published in 1849. He died in Sheffield, July 24, 1848.

Robertson, Frederick William, an English preacher; born in London, Feb. 3, 1816. He attended the grammar school of Beverley, and in 1830 became a pupil of the Edinburgh Academy, and afterward attended the university of that city. Failing to obtain a commission in the army, he matriculated at Brasenose College, Oxford, in 1837, with a view to enter the Church. He was ordained in 1840, and took priest's orders a year later. He then went abroad, and at Geneva married the daughter of Sir George William Denys. From 1842 to 1846 he was curate at Christ Church, Cheltenham. He then went to Germany and endeavored to acquaint himself with the views of the German theologians. He became incumbent of Trinity Chapel, Brighton, in 1847; and continued in this charge with increasing fame as a preacher till his death. His views on the Sabbath, the atonement, baptism, and inspiration were assailed as unorthodox, and he was accused of preaching democracy and socialism. The energy with which he devoted himself to his profession is said to have shortened his days. Besides occasional addresses his published works embrace "Lectures and Addresses on Literary and Social Topics" (8vo. London, 1858), "Analysis of Tennyson's In Memoriam" (1862), and several series of sermons and lectures. He died in Brighton, Aug. 15, 1853.

Robertson, James Burton, an English historian; born in London, England, Nov. 15, 1800; studied literature, philosophy, and the elements of dogmatic theology, in

France; and after various preliminary essays published a translation of Frederick Schlegel's "Philosophy of History" (1835) which passed through many editions. His second translation, "Symbolism, or Exposition of Doctrinal Differences between Catholics and Protestants" (1843), was also widely read in both England and America and created a profound impression. His original writings include: "Public Lectures on Some Subjects of Ancient and Modern History" (1859); "Lectures on Some Subjects of Modern History and Biography" (1864); and many others. He died in Dublin, Feb. 14, 1877.

Robertson, Joseph, a Scottish antiquary; born in Aberdeen, May 17, 1810, was educated at Udney Academy, and the grammar school and Marischal College of his native city. An Episcopalian and Conservative, he was apprenticed to a lawyer, but took early to writing, and, after six years of literary work at Edinburgh was a newspaper editor at Aberdeen, Glasgow, and Edinburgh from 1839 to 1853. He was in that year appointed curator of the historical department of the Edinburgh Register House. He was an originator of the Aberdeen Spalding Club (1830-1870) for which he edited four works. Of his other works may be noticed "The Book of Bon-Accord, or a Guide to the City of Aberdeen" (1839), "Catalogues of the Jewels, Dresses, Books, and Paintings of Mary Queen of Scots" (Bannatyne Club, 1863), the invaluable "Concilia Scotiæ: "Ecclesiæ Scoticanæ Statuta, 1225-1559" (1866), and an admirable article in the "Quarterly Review" for June 1849, on "Scottish Abbeys and Cathedrals." He died Dec. 13, 1866.

Robertson, Thomas William, an English dramatist; born in Newark, England, Jan. 29, 1829. His parents being actors, he early went on the stage, but never was a success. In 1853 he settled in London, where for several years he struggled on with light literature. In 1864 he had considerable success with "David Garrick," a play produced by Sothorn; but his fame rests on a series of plays produced at the Prince of Wales' Theater (1866-1870), including "Ours," "Caste," "Play," "School," and "M. P." Though sneered at on their production by certain critics, and nicknamed "cup-and-saucer dramas," they have deservedly secured a permanent place on the stage. His principal dramatic works were published in 1890 by his son. He died in London, Feb. 3, 1871.

Robertson, William, a Scotch historian; born in Borthwick, Scotland, Sept. 19, 1721; Having completed his theological studies at Edinburgh, he obtained a license to preach and in 1743 was presented to the living of Gladsmuir, in East Lothian. He soon be-

Robertson

came distinguished by his eloquence as a preacher; but it was not till 1759 that, by his "History of Scotland," he acquired a place among British classical writers. The distinction he acquired by this work, which reached a 14th edition before his death, appeared in his successive preferments. He became King's chaplain in 1761, principal of the University of Edinburgh in 1762, and Historiographer-Royal of Scotland in 1764. His other works are: "History of Charles V."; "History of America," and "An Historical Disquisition concerning the Knowledge which the Ancients had of India." As a historian Dr. Robertson is admired for luminous and skillful arrangement, graphic description and a singularly perspicuous style. He died near Edinburgh, June 11, 1793.

Robertson, William H., an American lawyer; born in Bedford, N. Y., Oct. 10, 1823; was admitted to the bar in 1847; elected a member of the State Assembly in 1849, and of the State Senate in 1854; and was a presidential elector on the Republican ticket in 1860. During the Civil War he rendered efficient service in raising and organizing State troops for the Union armies. He was a member of Congress in 1867-1869 was reelected to the New York State Senate in 1872; and was appointed collector of the port of New York in 1881. His nomination to this office by President Garfield, without consultation with the senators from New York, Roscoe Conkling and Thomas C. Platt, led to their resignation and to the defection of the "Stalwart" wing of the Republican party. He died in Katonah, N. Y., Dec. 6, 1898.

Robeson, George Maxwell, an American lawyer; born in Belvidere, N. J., in 1829; was graduated at Princeton University in 1847; studied law; was admitted to the bar in 1850, and in 1867 became attorney-general of New Jersey. He was appointed Secretary of the Navy in 1869; served for a short time as Secretary of War on the resignation of General Belknap in 1867; and was elected to Congress in 1878 and 1880. After retiring from Congress, he practised law in Trenton, N. J., where he died, Sept. 27, 1897.

Robeson, Henry Bellows, an American naval officer; born in New Haven, Conn., Aug. 5, 1842; was graduated at the United States Naval Academy in 1860; served through the Civil War; participated in the action against the defenses of Charleston, S. C., April 7, 1863, and on July 10 of the same year led the landing party from the "New Ironsides" in the attack on and capture of the Confederate works on Morris Island; took part in both attacks on Fort Fisher; was promoted captain in 1887; com-

Robespierre

modore in 1898; and rear-admiral in 1899; and was retired in the latter year.

Robespierre, Maximilien Marie Isidore, a French revolutionist; born of a family of Irish origin, in Arras, May 6, 1758. His mother died in 1767, his broken-hearted father two years later, and the four children were brought up by their maternal grandfather, an Arras brewer. Maximilien, the eldest, early showed unusual promise, and was educated at Arras and at the College Louis-le-Grand at Paris, where Camille Desmoulins was a fellow student. He was admitted *avocat* in 1781, and next year was named criminal judge by the Bishop of Arras, but resigned his place soon after to avoid passing a sentence of death. All through life a fanatical devotee of the Gos-



MAXIMILIEN ROBESPIERRE.

pel according to Rousseau, his sentimentality and taste for verses made him popular among the Rosati at Arras. He drew up the *cahier* or list of grievances for the guild of cobblers, and was elected to the States-General in 1789 as one of the deputies for the *tiers état* of Artois. He soon attached himself to the extreme Left—the "thirty voices," and though his first speeches excited ridicule, it was not long before his earnestness and his high sounding phrases commanded attention. "That young man believes what he says; he will go far," said Mirabeau, forecasting his future with the divination of genius. Indeed his influence grew daily, both in the Jacobin Club and in the Assembly, and thousands among the mob of patriots outside became fanatical in their admiration of his sincere cant and his boasted incorruptibility.

Three days after the death of Mirabeau he called on the Assembly to prevent any deputy from taking office as minister for

four years, and in the following month (May, 1791) carried the motion that no member of the present Assembly should be eligible for the next. This policy grew out of the narrow and acrid suspiciousness of his own nature, and reveals the inherent meanness of his aims and his failure to grasp that grand idea of real parliamentary government by a responsible ministry which had been the dearest dream of Mirabeau. Next followed Robespierre's appointment as public accuser, the king's flight to Varennes (June 21), Lafayette's last effort to control the sacred right of Insurrection on the Champ-de-Mars (July 17), the abject terror of Robespierre, his sheltering himself in the house of Duplay, a carpenter, his hysterical appeal to the club, the theatrical oath taken by every member to defend his life, and his being crowned with chaplets, along with Pétion, and carried home in triumph by the mob at the close of the Constituent Assembly, Sept. 30.

After seven weeks of quiet he sold his small patrimony and returned to Paris, to the house of Duplay, where he remained till the last day of his life. He was much beloved in the family, and a passion quickly sprung up betwixt himself and his host's eldest daughter, Elénore, a romantic girl of 25. His room was a humble chamber in which he worked and slept; its decorations, a few busts and portraits of himself. Alone among the patriots he was noted for the carefulness of his dress, which never varied in the slightest—powdered hair, a bright blue coat, white waistcoat, short yellow breeches, with white stockings and shoes with silver buckles. Small and feeble in frame, solitary and reserved in habits, he ever wore an anxious look on his straitened and spectacled face; his complexion was atrabilious, even *verdâtre*; and he retained to the last the sobriety of the cynic, drinking only water.

Meantime the Girondist party had been formed in the new Legislative Assembly, its leaders—the loudest, Brissot—eager for war. Robespierre, who ever feared and disliked war, offered a strenuous opposition in the debates of the Jacobin Club, and sometimes, if seldom, in his endless and windy harangues rose into the region of real eloquence. Fundamentally an empty pedant, inflated with words which he mistook for ideas, in his orations he is ever riding in the air on theories, his foot never on the solid ground of the practical. In April, 1792, he resigned his post of public prosecutor. He was invisible during the crisis of Aug. 10, but joined the Hôtel-de-Ville faction, and on Aug. 16 he presented to the Legislative Assembly its petition for a Revolutionary Tribunal and a new Convention. It does not appear, however, that he was in

any sense directly responsible for the atrocious September massacres in the prisons, or more than a mere accessory after the fact. For his reward he was elected first deputy for Paris to the National Convention, which opened on Sept. 21.

The bitter attacks on him by the Girondists were renewed only to throw Robespierre into a closer union with Danton and his party, but the final struggle was interrupted for a little by the momentous question of the king's trial. Robespierre opposed vigorously the Girondist idea of a special appeal to the people on the king's death, and his execution (Jan. 21, 1793) opened up the final stage of the struggle, which ended in a complete triumph of the Jacobins on June 2 of the same year. The first Committee of Public Safety—a permanent Cabinet of Revolution—was decreed in April, 1793, but Robespierre was not elected till July 27.

He was now for the first time one of the actual rulers of France, but it is open to question whether for the whole 12 months from this time to the end he was not merely the stalking horse for the more resolute party within the Twelve. His vaunted respectability, his great popularity with the mob, and his gift of fluent, if vague and windy, oratory, made an admirable cover for the truculent designs of strong and completely unscrupulous men like Billaud-Varennes and Collot d'Herbois and at least it is certainly the case that Couthon and Saint-Just were the only members whose political and social ideals coincided with his own. Destitute of political intuition, without foresight or sagacity, himself the mere dupe of a few borrowed phrases, he was strong because within his narrow limits he was honest, and because he actually had a horizon of social ideals not nakedly identical with his own advantage. He was astute enough, moreover, to play off one force against another—the Convention, the Commune, and the Committee, while he derived his strength from the constant worship of the club.

The next scenes in the dark drama of Revolution were the dark intrigues and desperate struggles that sent Hébert and his friends to the scaffold on March 24, 1794, and Danton and Robespierre's school fellow, Camille Desmoulins, on April 5, after. Hébert Robespierre had long disliked, and Chaumette's crazy deification of the Goddess of Reason had filled him with disgust; Danton he at once hated and feared with that fierce and spiteful hatred he ever felt instinctively for men like the great Tribune and Vergniaud with natural gifts beyond his own. "Robespierre will follow me: I drag down Robespierre," said Danton with prophetic truth. The next three

months he reigned supreme, but his supremacy prepared the way for his inevitable fall. He nominated all the members of the government committee, placed his creatures in all places of influence in the commune of Paris, sent his henchman Saint-Just on a mission to the armies on the frontier, assumed supreme control of the Revolutionary Tribunal, and completely revolutionized its method of operation by the atrocious measure introduced by his creature Couthon on the 22d Prairial (June 10), to the effect that neither counsel nor witnesses need be heard if the jury had come otherwise to a conclusion. The fatal significance of this change—a complete abrogation of all laws—is seen in the fact that from this time till the day of Robespierre's death the daily tale of victims of the guillotine averaged almost 30.

But, in accordance with the law that governs all human things, as Robespierre's power increased his popularity decreased, *Tappe-durs* had excited derision and resentment, but his declaration on May 7 of a new religion for the State—the foundation of a new regime of public morality—awakened in the mind of Paris the slumbering sense of humor. The Convention at Robespierre's instance agreed to compliment the Supreme Being with an acknowledgment of His existence and themselves with the Consolatory Principle of the Immortality of the Soul, to be celebrated in 36 annual festivals. The first of these was held on June 8, when Robespierre, glorious in a new light-blue coat, walked in front of the procession and delivered his soul of a vapid harangue, and set fire to pasteboard figures representing Atheism, Selfishness, Annihilation, Crime, and Vice. An old mad woman named Catherine Thect, who thought herself the mother of God, now declared Robespierre to be the new divine Saviour of the world and drew down on him still further ridicule in the Convention.

Meantime the pace of the guillotine grew faster, though apparently Robespierre hoped to bring it to a close as soon as all his more dangerous enemies, like Tallien, Fouché, and Vadier, were cut off. At the same time the public finance and the work of government generally drifted to ruin, and Saint-Just openly demanded the creation of a dictatorship in the person of Robespierre as alone possessing intellect, energy, patriotism, and revolutionary experience enough. On July 26 (8th Thermidor), after about a month's absence, the dictator delivered a long harangue complaining that he was being accused of crimes unjustly. He was listened to in deep unsympathetic silence, and the Convention, after at first obediently passing his decrees,

next rescinded them and referred his proposals to that committee, and the sitting ended without anything being concluded. That night at the Jacobin Club his party again triumphed, and the Tallien party in despair hurried to the members of the Right, the Girondist remnant, and implored their help against the common enemy at this desperate juncture. Next day at the Convention Saint-Just could not obtain a hearing. Tallien, Billaud-Varennes, and Vadier vehemently attacked Robespierre, and the voice of the dictator himself was drowned with cries of "Down with the tyrant." Turning to the Right, "I appeal to you whose hands are clean," he cried, but the Right sat in stony silence. "President of Assassins, I demand to be heard," he cried, but his voice died down in his throat. "The blood of Danton chokes him," cried Garnier. An unknown deputy named Louchet proposed that Robespierre should be arrested, and at the fatal words his power crumbled into ruins. His younger brother and Lebas demanded to be included in the honorable sentence. Vain attempts were made by the Jacobin Club and the Commune to save their hero, but Paris refused to move, and even Henriot's artillerymen to obey. Robespierre broke his arrest and flew to the Common Hall, whereupon the Convention at once declared him out of the law. The National Guard under Barras turned out to protect the Convention, and Robespierre had his lower jaw broken by a shot fired by a gendarme named Merda, or, as many believed, by his own hand. Next day (July 28; 10th Thermidor, 1794), still in his light-blue coat, the miserable, trembling wretch died with Saint-Just, Couthon, and 19 others by the guillotine; the day after 71 members of the municipality followed, 12 more on the third day, and the Reign of Terror was extinguished in a sea of blood.

Robin, American, or Migrating Thrush, the *Turdus migratorius*; specific character dark-ash color; beneath, brownish-red; head and tail black; the two exterior feathers of the latter white at the inner tip. The robin is found in summer throughout North America from Alaska to Mexico. They retire from higher latitudes only as their food begins to fail, or till driven S. by inundating snows. During the winter months they are numerous in the Southern States. Even as far N. as Boston robins are sometimes seen assembling round the open springs in the depth of winter. Toward the close of January the robin is still in South Carolina, and about the second week of March begins to appear in the Middle States. By the 10th of March they may also be heard in New England. Their nests are often seen

Robin Goodfellow

on the horizontal branch of an apple tree, or in a bush or on a tree in the woods. The eggs, about five, are of a bluish-green, and without spots. They raise several broods in a season. Robins seem content in a cage, sing well, and readily learn lively parts of tunes. They soon learn to imitate the notes of most of the birds about them.

Robin Goodfellow, the same as PUCK (*q. v.*).

Robin Hood, the hero of a group of old English ballads, represented as an outlaw and a robber, but of a gallant and generous nature, whose familiar haunts are the forests of Sherwood and Barnsdale, where he fleets the time carelessly in the merry greenwood. He is ever genial and good-natured, religious, respectful to the Virgin and to all women for her sake, with a kind of gracious and noble dignity in his bearing. He lives by the king's deer, though personally most loyal, and wages ceaseless warfare on all proud bishops, abbots, and knights, taking of their superfluity, and giving liberally to the poor and to all honest men in distress, of whatever degree. He is unrivalled with the bow and quarter-staff; but in as many as eight of the extant ballads comes off the worse in the combat with some stout fellow, whom he thereupon induces to join his company. His chief comrades are Little John, Scathlok (Scarlet), and Much; to these the "Gest" adds Gilbert of the White Hand and Reynold. A stalwart curtal friar, called Friar Tuck in the title though not in the ballad, fights with Robin Hood, and apparently accepts the invitation to join his company, as he appears later in two broadsides which also mention Maid Marian. Such is the romantic figure of the greatest of English popular heroes—a kind of yeoman counterpart to the knightly Arthur.

The earliest notice of Robin Hood yet found is that pointed out by Percy in "Piers Plowman," which, according to Skeat, cannot be older than about 1377. Here Sloth says in his shrift that, though but little acquainted with his paternoster, he knows "rymes of Robyn Hood and Randolf, erle of Chestre." In the next century we find him mentioned in Wyntoun's "Chronicle of Scotland" (1420); a petition to Parliament in the year 1439 represents a broken man in Derbyshire taking to the woods "like as it hadde be Robyn-hode and his meyné"; Bower, in his "Scotichronicon" (1441-1447), describes the lower orders of his time as entertaining themselves with ballads both merry and serious about Robin Hood, Little John, and their mates, and preferring them to all others; and Major or Mair (1470-1550) says in his "Historia Maioris Britanniae" that Robin Hood ballads were sung all over Britain. The last

Robin Hood

passage gives apparently the earliest mention of those more romantic and redeeming features of Robin Hood which earned him a place in Fuller's "Worthies of England," under his proper county, sweet Nottinghamshire, "not for his thievery but for his gentleness." Yet another 15th-century mention occurs in the "Paston Letters," where Sir John Paston writes in 1473 of a servant whom he had kept to play Robin Hood and the Sheriff of Nottingham.

Fragments of two Robin Hood plays exist, one dating from 1475, the other printed by Copland with the "Gest" about 1550. The latter is described in the title as "very proper to be played in Maygames." Robin Hood was a popular figure in these during the 16th century, as we find from Stow, Hall, and other writers, and there is evidence that in this connection he was known as far N. as Aberdeen. In place names again we find traces of him in cairns, mounds, hills, rocks, crosses, fountains, caves, and oaks from Somerset to Whitby. In the "Gest" the localities around Barnsdale are topographically correct, down to the place of his death at the priory of Kirkless between Wakefield and Halifax. Here the valiant outlaw is treacherously bled to death by his kinswoman the prioress, to whom he had gone for relief in his sickness. His last charge to Little John is completely true to his character, and is expressed in lines of touching simplicity:

Lay me a green sod under my head,
And another at my feet;
And lay my bent bow by my side,
Which was my music sweet;
And make my grave of gravel and green,
Which is most right and meet.

There is no evidence worth anything that Robin Hood was ever more than a mere creation of the popular imagination, but in due time the yeoman became a political personage, and was transformed into an Earl of Huntingdon for whom a suitable pedigree was constructed. Both Sir Walter Scott, in "Ivanhoe," and Thierry, in his "Conquête de l'Angleterre," make him a Saxon chief holding out like Hereward against the Normans; Bower, the continuator of Fordun, distinctly calls him one of the proscribed followers of Simon de Montfort; Joseph Hunter (1852) makes him an adherent of the Earl of Lancaster in the insurrection of 1322. The last scholar discovered a still further and exceptionally amusing mare's nest in the name of one Robyn Hode, who entered the service of King Edward II. about Christmas, 1323, as one of the "vadlets, porteurs de la chambre," and was 11 months later found unfit for his duties, and paid off with a gift of five shillings. "To detect 'a remarkable coincidence between the ballad and the record' requires," says Professor Child, "not only a theoretical prepossession

sion, but an uncommon insensibility to the ludicrous." Kuhn again identifies our outlaw with Woden; others with a sun god, a woodland deity, and the like—all which subtleties of speculation are unnecessary if we readily admit that the hero of popular creative imagination may well have formed a peg round which to hang much old-world wood-lore even then fast fading into forgetfulness.

Of Robin Hood ballads there have come down to us in more or less ancient form as many as 40, of which eight may be said to be of the first importance, and of almost the finest quality of ballad poetry. Of the remaining 32, as Professor Child points out, about half a dozen have in them something of the old popular quality; as many more not the least snatch of it. Fully a dozen are variations, sometimes wearisome, sometimes sickening, on the theme "Robin Hood met with his Match." The best of all the cycle are perhaps "Robin Hood and the Monk," and "Robin Hood and Guy of Gisborne," and both open with a delightful glimpse of the green wood a century and more before its time in English poetry:

In somer, when the shawes be sheyne,
And leves be large and long,
Hit is full mery in feyre foreste
To here the foulys song:

To se the dere draw to the dale,
And leve the hilles hee,
And shadow hem in the leves grene,
Under the grene-wode tre.

The second begins no less beautifully:

When shawes beene sheene, and shradds full fayre
And leeves both large and longe,
Itt is merry, walking in the fayre fforrest,
To hear the small birds songe.

The "Lytell Geste of Robyn Hode" was printed by Wynken de Worde, most probably before 1500, a long poem of over 1,800 lines, arranged in eight fyttres, being a not unskilful redaction of at least four earlier distinct ballads.

Robinoir. See BEAUNOIR.

Robins, Benjamin, an English mathematician, the father of the military art of gunnery; born in Bath, England, in 1707 of a poor Quaker family. Having obtained a little instruction in mathematics, he prosecuted this branch of science with great zest, and, having removed to London, set up for a teacher of mathematics, and published several mathematical treatises which gained for him considerable reputation. Robins next commenced his great series of experiments on the resisting force of the air to projectiles, varying his labors by the study of fortification, and invented the ballistic pendulum. In 1734 he demolished, in a treatise entitled "A Discourse concerning the Certainty of Sir I. Newton's Method of Fluxions," the objections brought by the celebrated Berkeley, Bishop of Cloyne, against Newton's principle of ultimate

ratios. His great and valuable work, the "New Principles of Gunnery," on the preparation of which he had spent an enormous amount of labor, appeared in 1742, and produced a complete revolution in the art of gunnery. In consideration of his able defense of the policy of the then government, by means of pamphlets which he wrote and published from time to time, he received (1749) the post of engineer-in-general to the East India Company; but his first undertaking, the planning of the defenses of Madras, was no sooner accomplished than he was seized with a fever, and died July 29, 1751.

Robinson, Agnes. See DARMESTETER.

Robinson, Charles Seymour, an American clergyman; born in Bennington, Vt., March 31, 1829. He was famed as a collector of hymns and tunes used in the Presbyterian Church. His publications include: "Songs of the Church" (1862); "Songs for the Sanctuary" (1865); "Church Work" (1873); "Studies in the New Testament" (1880); "Laudes Domini" (1884); "The Pharaohs of the Bondage and the Exodus" (1877); "Simon Peter, his Life and Times" (1888); "From Samuel to Solomon" (1889); "New Laudes Domini" (1892); "Annotations upon Popular Hymns" (1893); "Simon Peter: Later Life and Labors" (1894); and others. He died Feb. 1, 1899.

Robinson, Edward, an American philologist; born in Southington, Conn., April 10, 1794; was graduated at Hamilton College in 1816; and there remained till 1821, when he went to Andover, Mass., to see through the press an edition of part of the "Iliad." Here he studied Hebrew under Professor Stuart, but in 1826 went to Germany, where he studied under Gesenius and Neander, and married as his second wife Therese A. L. von Jakob, daughter of a professor at Halle. In 1830 he became Professor of Sacred Literature at Andover, in 1837 Professor of Biblical Literature in the Union Theological Seminary, New York. He then made an extensive survey of Palestine, collecting materials for "Biblical Researches in Palestine and Adjacent Countries" (1841). A second visit in 1852 yielded fruit for its second edition (1856). He died in New York city, Jan. 27, 1863.

Robinson, Frederick William, an English novelist; born in Spitalfields, London, Dec. 23, 1830. He was a most prolific and skillful writer, and published, among many others: "No Church" (1862); "Beyond the Church" (1866); "True to Herself" (1870); "Her Face was her Fortune" (1873); "As Long as She Lived" (1876); "The Hands of Justice" (1881); "The Man She Cared For" (1884); "Dark Street" (1887); and "The Youngest Miss

Robinson

Green" (1888); "The Keeper of the Keys" (1890); "The Secretary" (1895); etc. He died in London, Dec. 6, 1901.

Robinson, Henry Crabb, an English diarist; born in Bury St. Edmunds, March 13, 1775; acquired a thorough knowledge of modern German literature and enjoyed the friendship of Goethe, Schiller, and others. Robinson left a copious diary and correspondence, selections from which were published under the title of "Diary, Reminiscences, and Correspondence" (1869), valuable for its description of the men and events of his time in England. He died in London, Feb. 5, 1867.

Robinson, John, an English Independent clergyman; born in Lincolnshire about 1576; said to have been educated at Corpus Christi College, Cambridge. He took orders in the Church of England, did pastoral work at or near Norwich, was suspended for non-conformity about 1603, became a Separatist, and joined a congregation of Independents at Scrooby, Nottinghamshire, of which he was made pastor. To escape persecution, many of this congregation emigrated with him to Amsterdam, Holland, in 1608. The next year they removed to Leyden, where they came to number more than 1,000 souls. Robinson was a man of broad tolerance as well as of sound learning, but he was forced into numerous controversies with both Anglican and Puritan opponents. Soon his flock realized that they must seek a securer home, and a portion of the congregation, with the approval of Robinson, who intended to follow them, emigrated to America in 1620. They were the "Pilgrims" who founded Plymouth colony in Massachusetts. Robinson was prevented from joining them, but he corresponded with "the church of God at Plymouth, New England," and he is regarded as one of the chief founders of Congregationalism. His works, with a memoir, were published by Robert Ashton (1851). He died in Leyden, March 1, 1625.

Robinson, John Cleveland, an American soldier; born in Binghamton, N. Y., April 10, 1817. He served in the Mexican War and against the Indians, was made brigadier-general in 1862, and held commands in many battles of the Civil War. He died in Binghamton, Feb. 18, 1897.

Robinson, Stillman Williams, an American inventor; born in Reading, Vt., March 6, 1838; was graduated at the University of Michigan in 1863; professor of mechanical engineering at the University of Illinois in 1870-78, and at the Ohio State University in 1878-94. He invented a thermometer-graduating machine, machines for shoe manufacturing, etc., and published: "Teeth of Gear Wheels and the Robinson Templet Odontograph" (1876); "Railroad Economics" (1882); "Principles of Mechanism" (1896); and other works.

Rob Roy

Robinson, Therese Albertine Luise (von Jakob) (pseudonym "TALVJ"—her initials), a German author; born in Halle, Germany, Jan. 26, 1797. Her most important work is "A Historical View of the Languages and Literature of the Slavic Nations" (1850). Among her other writings are: "Psyche: Original Tales" (1824); "Servian Songs" (1825-26); and "Characteristics of the Popular Songs of the German Nations" (1840). She died in Hamburg, April 13, 1870.

Robinson Crusoe, a story by Daniel Defoe (1719), founded on the adventures of Alexander Selkirk (*q. v.*). It is one of the most famous works of English romance, and has been translated into various languages. A reprint edited by Austin Dobson (London, 1883) contains a bibliography.

Rob Roy ("Robert the Red"), a Scottish outlaw; born in Buchanan parish in 1671. His real name was Robert MacGregor, but he assumed that of Campbell on account of the outlawry of the clan MacGregor by the Scottish Parliament. From youth he was a master of the claymore, the uncommon length of his arms giving him much advantage, for without stooping he could tie the garters of his Highland hose, two inches below the knee. His herds were so often plundered by "broken men" from the N. that he had to maintain a band of armed followers to protect both himself and such of his neighbors as paid him blackmail. And so with those followers, espousing in 1691 the Jacobite cause, he did a little plundering for himself, and, two or three years later having purchased from his nephew the lands of Craig Royston and Inversnaid, laid claim thenceforth to be chief of the clan.

In consequence of losses incurred about 1712 in unsuccessful speculations in cattle, for which he had borrowed money from the Duke of Montrose, his lands were seized, his houses plundered, and his wife shamefully used, turned adrift with his children in midwinter. Maddened by these misfortunes, Rob Roy gathered his clansmen and made open war on the duke, sweeping away the whole cattle of a district, and kidnapping his factor with rents to the value of more than \$15,000. This was in 1716, the year after the Jacobite rebellion, in which at Sheriffmuir Rob Roy had "stood watch" for the booty, and had been sent by the Earl of Mar to raise some of the clan Gregor at Aberdeen, where he lodged with a kinsman, Professor Gregory. Marvellous stories are current round Loch Katrine and Loch Lomond (where a cave near Inversnaid still bears his name) of his hairbreadth escapes from capture, of his evasions when captured, and of his generosity to the poor, whose wants he supplied at the expense of the rich. They in turn gave him timely warning of the designs of his two

arch-foes, the Dukes of Montrose and Athole, and of the red-coats they called to their aid from Dumbarton and Stirling; besides, Rob Roy enjoyed the protection of the Duke of Argyll, having assumed the name Campbell, his mother's. Late in life he is said to have turned Catholic, but in the list of subscribers to the Episcopalian Church history of Bishop Keith occurs the name "Robert Macgregor *alias* Rob Roy." The history came out in 1734, and on Dec. 28 of that year Rob Roy died in his own house at Balquhider. He left five sons, two of whom died in 1734—James, an outlaw, in Paris; and Robin, the youngest, on the gallows at Edinburgh for abduction.

Robusti, Jacopo. See TINTORETTO.

Roc, or Rukh, a fabulous bird of immense size, able to carry off an elephant in its talons. The idea is familiar in the East, and every reader will remember it in the "Arabian Nights' Entertainments." Colonel Yule pointed out that the huge fronds of the raphia palms were brought from Madagascar as roc's feathers. Mythical birds of similar size and strength were the Arabian *anka* and the Persian *simurgh*. The *amru* or *sinamru* was an older Persian supernatural bird; the Indian *garuda*, which bears Vishnu, is the king of birds. It has been suggested, without good grounds, that the legends of the roc might have originated in traditions of extinct birds of great size, like the *dinornis* or *æpyornis*, which, however, could not fly.

Rocaille. See Rococo.

Rocambole, in botany, (1) *Allium scorodoprasum*, a plant with bulbs like garlic, but with the cloves smaller. It is used for the same purposes as the shallot, garlic, etc. A native of Denmark. (2) *Allium ophioscorodon*, from Greece. Sometimes the two are considered to be identical.

Rochambeau (rō-shang-bō'), **Jean Baptiste Donatien de Vimeur, Comte de,** a marshal of France; born in Vendôme, July 1, 1725. He entered the French army in 1742, and distinguished himself in the Seven Years' War. In 1780-82 he commanded the French forces sent to aid the revolted British colonists in America. Returning to France in 1783, he became governor of Artois and Picardy, was made a marshal in 1791, and for a time commanded the Army of the North. During the Reign of Terror he narrowly escaped the guillotine. His "Mémoires" appeared in 1809. He died in Thoré, May 10, 1807.

Rochdale, a borough of England; in Lancashire, 10 miles N. N. E. of Manchester. It is a place of considerable antiquity, and was early noted for its woollen manufactures, which have remained a chief staple till the present day. Cotton is extensively manufactured, and there are also foundries,

machine shops, etc.; while in the neighborhood are quarries of freestone and extensive collieries. The town is irregularly built, and has many narrow streets, but of late years has been much improved. The parish church (St. Chad), of the 12th century, situated on an eminence, is approached from the lower part of the town by a flight of 122 steps. The town hall is a fine modern building, and there is a handsome free library. Rochdale is the center of the co-operative movement, which originated there in 1844. By means of canals it has a water communication with all the industrial centers of the N. of England. Pop. (1901) 83,112.

Roche (rōsh), **Antonin,** a French author; born in Solignac-sur-Loire, France, Nov. 10, 1813. He founded in London, classes in literature, history, geography, and astronomy, for young people, which proved very successful; and published both in London and Paris, in connection with this work, several educational books, among them being: "History of France" (1866); "The English Writers of the Nineteenth Century" (1868); "History of England" (1875).

Roche, James Jeffrey, an American author; born in Queen's county, Ireland, May 31, 1847. He went to Boston in 1866 and in 1883 became an editor of the "Pilot," of which in 1890 he was made editor-in-chief. He published: "Songs and Satires" (1886); "Life of John Boyle O'Reilly" (1891); "The Story of the Filibusters" (1891); "Ballads of Blue Water" (1895); "By-Ways of War" (1899); etc. He died April 3, 1908.

Roche, Regina Maria, an Irish novelist; born about 1764 in the S. of Ireland. She sprang into fame on the appearance of the novel "The Children of the Abbey" (1798), a story abounding in sentimentality, abductions, secret retreats, etc.—a cross between the "Mysteries of Udolpho" and domestic novels like "Clarissa Harlowe." From that time till her death she produced many books of the same character, including: "The Nocturnal Visit" (1800); "The Tradition of the Castle" (1824); "The Castle Chapel" (1825); "The Nun's Picture" (1834); and many others. She died in Waterford, May 17, 1845.

Rochefort, Victor Henri, a French journalist; born in Paris, France, Jan. 30, 1830. He was removed from the editorship of "Figaro" because of his satires on the imperial government; and the papers which he himself founded—"The Lanterne"; "The Marseillaise"; "The Password"—were filled with the same violent attacks. He was more than once exiled from France for long periods. His last venture, "The Irreconcilable," was noted for the virulence of its criticisms on leading politicians of the day. He wrote and published much,—

farces, vaudevilles, comic romances, and political works. Among them: "The Depraved Ones" (1875); "Return from Nova Scotia" (1877); "Mlle. Bismarck" (1880); "Bitter Farces" (1886); "The [political] Lanterns of the Empire" (1884); and "Fantasia" (1888).

Rochefort-sur-mer, a French seaport, naval arsenal, and fortress of the first class, in the department of Charente-Inférieure; on the right bank of the Charente, 9 miles from its mouth, and 18 miles S. S. E. of Rochelle, 89 S. W. of Poitiers. It was founded in 1665 as a naval station by Colbert, Louis XIV.'s minister, and fortified by Vauban, being covered now on the sea side by strong forts; and it is a modern, clean, well-built place, with which few French towns can compare for the number and importance of its public works. The most celebrated of these is the naval hospital (1783-1788), with nearly 1,300 beds, and an artesian well 2,758 feet deep. There are both a naval harbor, and, higher up the river, a commercial harbor with three basins; Rochefort besides possesses rope walks, cannon foundries, and other establishments for the manufacture and preservation of naval stores and marine apparatus of every kind. From 1777 till 1852 it was the seat of a great convict prison. Napoleon meant to take ship for the United States at Rochefort, but instead had to surrender to Captain Maitland of the "Bellevue," July 15, 1815. Pop. (1906) 36,694.

Rochefoucauld, François, Duc de la, Prince de Marillac, a French author; born in Paris, France, Sept. 15, 1613. His celebrity is due to his small volume of "Reflections, or Moral Sentences and Maxims," commonly known as the "Maxims" (first ed. 1665; final edition of the author 1678, comprising 504 maxims). The dominant note of the "Maxims" is egoism: virtue and vice are in themselves indifferent. This philosophy of life is set forth with consummate wit and in a style of faultless elegance. His "Memoirs" (1662) possess literary merit in a degree hardly inferior to the "Maxims"; and in historical interest they are equal to the most celebrated memoirs of the time. He died in Paris, March 17, 1680.

Rochelle (rō-shēll'), **La**, a fortified town and seaport in France, capital of the department of Charente-Inférieure, on the Atlantic, 95 miles N. by W. of Bordeaux. The chief buildings are the cathedral, town hall, exchange, courts of justice, hospital, arsenal, and a public library. The harbor is easily accessible and commodious. The roadstead is protected by the islands of Ré and Oléron. La Rochelle has an extensive trade in wines, brandies, and colonial prod-

uce. In the religious wars it was long a Protestant stronghold. It stood an eight months' siege in 1572, but was forced to surrender by famine after three months in 1628. Pop. (1901) 31,559.

Rochelle Salt, the popular name of the tartrate of soda and potash ($\text{KNaC}_4\text{H}_4\text{O}_6 + 4\text{H}_2\text{O}$), this salt having been discovered in 1672 by a Rochelle apothecary named Seignette. It occurs, when pure, in colorless transparent prisms, generally eight sided; and in taste it resembles common salt. It is prepared by neutralizing cream of tartar (bitartrate of potash) with carbonate of soda. After a neutral solution has been obtained, it is boiled and filtered, and the resulting fluid is concentrated till a pellicle forms on the surface, when it is set aside to crystallize. This salt is a mild and efficient laxative, and is less disagreeable to the taste than most of the saline purgatives. From half an ounce to an ounce, dissolved in 8 or 10 parts of water, forms an average dose. A drachm of Rochelle salt added to one of the ingredients of an effervescing draught (bicarbonate of soda or tartaric acid, for example) forms one of the varieties of what are called seidlitz powders.

Roches Moutonnées, smooth, rounded, hummocky bosses and undulating surfaces of rock, of common occurrence in regions which have been overflowed by glacier ice. Those which have not been much acted on by the weather generally show the scratches and groovings which are the characteristic markings of glacial action. Sometimes roches moutonnées are smoothed and polished all over, and have the appearance of whales' or dolphins' backs. At other times they are smoothed only on one side—that side, namely, which faces the direction from which the glaciating agent flowed; the other side, protected from abrasion, being left in its original rough, unpolished condition. The name is that used by the Swiss peasants—the bare rounded rocks of a valley bottom when seen from above having a fanciful resemblance to a flock of sheep lying down.

Rochester, a city and county-seat of Olmsted co., Minn.; on the Zumbro river, and on the Chicago and Northwestern and the Winona and St. Peter railroads; 90 miles S. E. of St. Paul. Here are a German public high school, State Hospital for the Insane, a Roman Catholic Seminary, National banks, and several daily and weekly newspapers. It has a number of foundries, and manufactories of cockle-separators, wagons, furniture, and agricultural implements. The city was incorporated in 1858. A destructive cyclone leveled the lower town in 1883, causing the death of 27 persons. Pop. (1900) 6,072; (1910) 7,844.

Rochester

Rochester, a city and county-seat of Monroe co., N. Y.; on the Genesee river, and on the West Shore, the New York Central, the Lehigh, the Erie, and other railroads; 229 miles W. of Albany. In the center of the city are the Upper Falls of the Genesee, a perpendicular cataract of 96 feet, where Sam Patch made his last and fatal jump. Rochester is built on a plateau on both sides of the river, 263 feet above Lake Ontario.

Business Interests.—The city is the trade center of a large and rich agricultural region. In the Genesee river there are three falls, 96, 26, and 83 feet respectively, giving abundant waterpower for manufacturing. There are over 1,900 industrial establishments, employing upward of 40,000 persons, with a combined capital of about \$50,000,000, and an output of about \$70,000,000. The most important of these are flour mills, with a combined output valued

with 362 miles of mains; and a sewer system covering 223 miles. The streets are mainly lighted by electricity; the police department costs about \$185,000 annually, and the fire department about \$227,000. There is a public school enrollment of over 23,000 pupils, and an annual expenditure for public education of nearly \$665,000. The annual cost of maintaining the city government exceeds \$2,700,000. The annual death rate averages 14.42 per 1,000. Rochester is the seat of the UNIVERSITY OF ROCHESTER (*q. v.*), and the Rochester Theological Seminary. The most remarkable structure in the city and county is the aqueduct which carries the Erie canal across the Genesee river. It is of cut stone, 848 feet long, with a channel 45 feet wide, and is supported by nine arches. The noteworthy buildings include the City Hall, County Court House, the High School or Free Academy, the Arcade, the Powers Building,

the Rochester Savings Bank, the postoffice, and the Y. M. C. A. building. There are numerous libraries, hospitals, and other charitable institutions, of which the most important are the Western House of Refuge, the Western New York Institution for Deaf Mutes, and the Industrial Home.

History.—The site of the city was occupied by a few colonists as early as 1788, but the first permanent settlement was made by Nathaniel Rochester in 1810. The first frame house was built in 1812, and the place was incorporated under the name of Rochesterville in 1817. It received its city charter in 1834. Pop. (1890) 133,896; (1900) 162,608; (1910) 218,149.

Rochester, a city of Kent, England, 29 miles E. S. E. of London; chiefly on the right bank of the Medway, continuous with Chatham, and joined to Strood by an iron swing bridge constructed in 1850–1856 at a cost of \$850,000. The castle or keep, which crowns a steep eminence near the bridge, was the work of Archbishop William de Corbeuil (1126); but the wall overlooking the river contains Norman masonry of earlier date, built upon Roman foundations. It is 104 feet high and 70 feet square, with walls 12 feet thick, and is a very fine specimen of Norman architecture; it was taken by John (1215, the S. E. corner being rebuilt shortly afterward), vainly attacked by De Montfort (1264), and taken again by Tyler (1381). Both castle and grounds were purchased in 1883 by the corporation



ROCHESTER CATHEDRAL: INTERIOR.

at nearly \$5,000,000, the largest carriage and wagon factory in the United States, and manufactories of steam engines, agricultural machinery, lamps, stoves, glass ware, perfumery, india-rubber goods, photographic materials, cigarettes, shoes, etc. In the suburbs is an extensive nursery, including two great plants for the packing and shipment of garden and farm seeds. There are several National, State, and savings banks, besides loan and trust companies, and many daily, weekly, monthly, and other periodicals. The assessed property valuation exceeds \$103,000,000, and the total bonded debt is about \$9,000,000.

Public Interests.—The city has an area of 18 square miles; 325 miles of streets, of which 119 miles are paved; a system of waterworks, that cost nearly \$7,000,000,

from the Earl of Jersey. The episcopal see was founded in 604 by St. Augustine, and the foundations of the cathedral then built have lately been discovered. Bishop Gundulf (1077-1107) built a new cathedral, of which part of the crypt remains. This cathedral was rebuilt by Ernulf and John of Canterbury (1115-1137), whose nave remains; and the choir was again rebuilt and enlarged in the 13th century in part out of offerings of pilgrims at the shrine of St. William of Perth, a Scotch baker, who, on a pilgrimage to the Holy Land, was murdered near Chatham by his companion and adopted son; the tower rebuilt by Cottingham (1825-1826), the choir and transepts restored by Scott (1871-1877), and the W. front being restored by Pearson in 1891. It measures 306 feet in length, and has double transepts; and special features of interest are the Norman west doorway and nave, the Early English choir, of singular plan and early character, the spacious crypt, and a fine decorated doorway leading to the modern library. The ruins of an early Norman keep or residence built by Gundulf, the architect of the Tower of London, stand on the N. side of the choir. Of Rochester's bishops since 604, some 80 in number, may be mentioned Paulinus (previously first Bishop of York), Gundulf, Walter de Merton, Fisher, Ridley, Atterbury, and Horsley. St. Bartholomew's Hospital, founded by Gundulf in 1078 for lepers, was refounded in 1863; the Norman chapel remains. Watts' Charity House, founded in 1579 to lodge "six poor travelers, not being rogues or proctors," has been immortalized by Dickens, whose home, Gadshill, is 3 miles distant, and who introduces Rochester into "Pickwick," "Edwin Drood," and others of his novels. Three schools are the cathedral grammar school (Henry VIII.), Williamson's mathematical school (1701; reopened under a new scheme, 1880), and a grammar school for girls (1888); and other buildings are Satis House, Restoration House (Charles II. slept here in 1660), the guild hall (1687), and the corn exchange (1871). Rochester—the Roman station Durobrivæ and Anglo-Saxon Hrofe-ceastre—was made a municipal borough by Henry II. James II. embarked here in his flight (1688). Pop. (1901) 30,590.

Rochester, John Wilmot, Earl of, a witty English nobleman of the court of Charles II.; born in Ditchley, Oxfordshire, April 10, 1648, and was educated at Wadham College. He succeeded to the title and estates in 1659. He served in the fleet under Lord Sandwich, and distinguished himself at the attack on Bergen. On his return to England he became the personal friend and favorite of the king. His constitution gave way under his habits of

drunkenness and debauchery. His poetical works consist of satires, love songs, and drinking songs, many of them gems of wit and fancy, and many of them daringly immoral. He died July 26, 1680.

Rochester, University of, a coeducational institution in Rochester, N. Y.; founded in 1850 under the auspices of the Baptist Church; has endowment funds exceeding \$850,000; grounds and buildings valued at over \$575,000; volumes in the library, 52,000; ordinary income, \$75,000; average number of faculty, 25; average student attendance, 400; graduates, over 1,700.

Rochet, an ecclesiastical garment of fine white linen, differing from the surplice in being shorter and open at the sides. It was formerly worn by priests and acolytes, but is now worn by bishops under the chimere. Also, a kind of fish, by some taken for the roach, by others for the piperfish, one of the gurnards.

Rochon de Chabannes, Marc Antoine Jacques, a French dramatist; born in Paris, Jan. 25, 1730. He wrote a great number of successful comedies, published under the title of "Theater" (1786); besides "Slothful Nobility" (1756), and "Philosophic and Moral Discourse" (1768). He died in Paris, May 15, 1800.

Rock, any portion of the earth's crust, coherent or incoherent, any sedimentary stratum or any dyke or overlying mass of volcanic or plutonic mineral matter. The older writers drew a distinction between rocks and soils. Both are now regarded as rocks. So are blown sand, silt, mold, and peat; though the last is soft, spongy, and of vegetable origin. Were the vegetable character to exclude it, coal would have to be omitted too. Most rocks, originally soft, have become hard and compact by losing their moisture and being subjected to pressure. As a rule a rock is not a bed of some simple mineral. In most cases there are crystals cemented together by imperfectly crystalline or amorphous matter, or there is a mixture of angular and rounded grains, also bound together by mineral matter. See MINERALOGY. Viewed as to composition, there are three leading classes of rock: Siliceous or arenaceous, some formed of loose sand, others of hard sandstone, with all intermediate grades; argillaceous rocks, *i. e.*, rocks of clay, or more specifically having one-fourth alumina to three-fourths silica; and calcareous rocks composed chiefly of carbonate of lime, some of them proved, and most of the others suspected, to be originally composed of various organisms. Viewed as to their origin, Lyell long recognized four kinds of rocks: Aqueous or sedimentary, volcanic, metamorphic, and plutonic. A fifth category has now been superadded, *viz.*, aërial or æolian, formed

by the action of wind. Aqueous, æolian, and metamorphic rocks are, as a rule, stratified; volcanic and plutonic rocks generally unstratified; the last two are called igneous. Some stratified rocks are unfossiliferous, others fossiliferous. For the stratigraphical or chronological order of the latter, see FOSSILIFEROUS. Much light has recently been thrown on the composition and origin of rocks, by subjecting thin sections of them to microscopic examination. See GEOLOGY.

Rock Crystal. See QUARTZ.

Rockefeller, John Davidson, an American capitalist; born in Richford, Tioga co., N. Y., July 8, 1839. He engaged in business when he was 19, and soon showed ability in detail and discretion in management. When discoveries of petroleum roused speculative interest in 1860, he owned a refinery in Cleveland, O. He was quick to perceive that his opportunities were at hand. His business developed and enlarged with amazing rapidity. In 1870 he became president of the Standard Oil Company, through which he accumulated enormous wealth. In the years of his retirement from active business he made great gifts to promote education, science, religion, and charity, his known benefactions to the close of 1910 aggregating \$114,000,000. His largest gifts were \$50,000,000 to the General Education Board; \$24,800,000 to the University of Chicago; \$6,000,000 to the Rush Medical College; and \$2,600,000 to the Rockefeller Institute of Medical Research.

Rocket, a cylindrical case of pasteboard or metal, attached to one extremity of a light wooden rod, and containing a composition which, being fired, shoots the whole of the arrangement through the air, by that principle that an unbalanced reaction from the heated gases which issue from openings in fireworks gives them motion in the opposite direction. As signals between persons who were unable to communicate with each other on account of darkness or some other cause, rockets have long been employed. They were also used for the important service of determining the difference of longitude between two places. In signal rockets, the composition with which the case is filled consists generally of saltpeter, sulphur, and charcoal, or gunpowder; the whole is reduced to a mealed state, and well mixed together, the annexed being the proportions: Saltpeter, 4 pounds; sulphur, 1 pound; and charcoal, 1 pound 8 ounces. The mixture for producing rockets with stars, consists of, saltpeter, 8 pounds; sulphur 2 pounds; sulphide of antimony, 2 pounds; mealed powder, 8 ounces; and isinglass, 3¾ ounces. The last ingredient is dissolved in a quart of vinegar, after which 1 pint of spirits of wine is added, and then the

mealed composition is mixed with the liquid till the whole mass comes to be of the consistency of thick paste. After being molded into short cylinders and carefully dried, these cylinders are packed into the head with a small bursting charge. As soon as the rocket is shot off and burned out, the bursting charge opens the head and sets free the lighted stars. The force by which a rocket ascends is similar to that by which a gun recoils when it is fired. The rod serves to guide the rocket in its flight, the common center of gravity of the rocket and rod being a little below the top of the latter. The distance at which signal rockets can be seen varies between 35 and 40 miles; and the times of ascent from 7 to 10 seconds. At the beginning of the 19th century Sir William Congreve converted the rocket into a terrible projectile of war, with ranges which no ordnance of that day could attain. Discarding the small sizes, he made 12, 18 and 32-pound rockets which he charged with canister-shot, bullets, and other missiles. The stick for a 32-pound rocket is 18 feet in length, and the maximum range 3,500 yards. The range can be also increased by discharging the rocket from a cannon, with a time fuse to ignite it at the cannon's utmost range, when the rocket commences its own course. As missiles, these rockets are found to annoy most seriously the defenders in any fortified work, and in a bombardment they speedily set houses and buildings on fire. In the field, also, the plunging, ricochetting motion of the rocket greatly disturbs both cavalry and infantry. The Congreve rockets were first tried in actual service, and with fatal effect, at the attack on Copenhagen in 1807. A rocket is also a piece of wood employed to blunt the end of a lance in a tourney, to prevent it from doing hurt.

Rocket (*Brassica eruca*), a cruciferous plant of the cabbage genus growing wild in many parts of Europe. It has a strong, disagreeable odor, an acrid and pungent taste, but is much esteemed by some, and especially by the Italians, who use it in their salads. Its medicinal properties are anti-scorbutic and stimulant. The stem is about 1½ foot high, rough, with soft hairs, and bearing long pinnated leaves; the flowers are whitish or pale yellow, with violet veins. The term rocket is also applied to the different species of *Hesperis*—cruciferous plants with purple flowers, often cultivated for ornament in gardens.

Rockford, a city and county-seat of Winnebago co., Ill.; on the Rock river, and on the Illinois Central, the Chicago, Milwaukee, and St. Paul, the Burlington Route, and the Chicago and Northwestern railroads; 92 miles W. of Chicago. Here are a United States government building, the Illinois Art School, Rockford College, high

Rockhill

school, business college, waterworks, electric lights, a sanitarium, hospital, public library, several National banks, and a number of daily and weekly periodicals. The city has extensive manufacturing interests, including large reaper factories, paper mills, flour mills, cotton and furniture factories, woolen mills, a large watch factory, and about 200 smaller factories. The assessed property valuation exceeds \$5,000,000. Pop. (1890) 23,584; (1900) 31,051; (1910) 45,401.

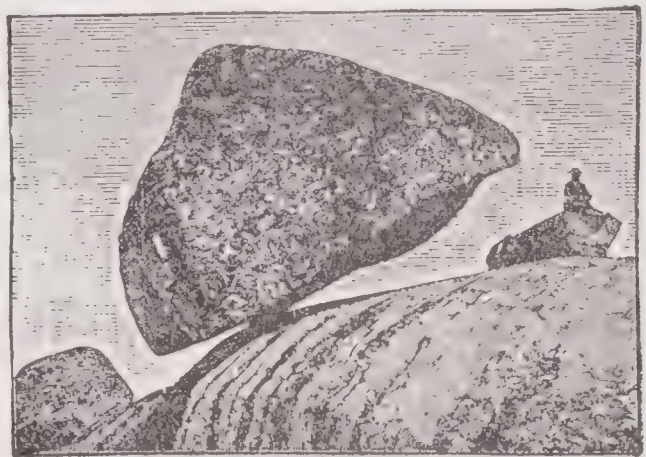
Rockhill, William Woodville, an American diplomatist; born in Philadelphia, Pa., in 1854; was Secretary of the American Legation at Peking in 1884-1888; *Chargé d'affaires* at Seoul, Korea, in 1886-1887; attached to the United States Department of State in 1893-1897; Minister to Greece, Rumania, and Servia in 1897-1899; Director of Bureau of American Republics in 1899-1905; Minister to China in 1905-1909; then became Ambassador to Russia. He was also a special Commissioner to China in 1900, a Plenipotentiary to the Congress of Peking for settling the Boxer troubles in 1901, and a signer of the final protocol of Sept. 7, 1901.

Rocking Stones, or Logans, large masses of rock so finely poised as to move backward and forward with the slightest impulse. They occur in nearly every country. Some of them appear to be natural, others artificial; the latter seem to have been formed by cutting away a mass of rock round the center-point of its base. The former are chiefly granitic rocks, in which felspar is abundantly present; for, this mineral being readily decomposed, the rock becomes disintegrated to grit, sand, and dust, which are carried away by rains and wind, so that what was formerly a solid rock soon assumes the appearance of a group of irregularly-shaped pillars, separated into portions by horizontal and vertical fissure. As decay proceeds, the edges of the blocks forming the pillar are first attacked and disappear, and the pillar now becomes a pile of two or more spheroidal rocks, resting one on the other. Should a mass of rock be so situated as to preserve its equilibrium in spite of the gradual diminution of its base or point of support, a rocking stone or logan is the result. Though rocking stones are most frequently of granitic nature, they occur also among basalts and other crystalline igneous masses. Various explanations have been given of the uses of these singular objects. They are supposed to have been used in very early times for purposes of divination, the number of vibrations determining the oracle; hence it came to be believed that sanctity was acquired by walking round them.

Some rocking stones occur near remains of ancient fortifications, which seems to bear out a statement in one of the poems of Os-

Rock Island

sian, that the bards walked round the stone singing, and made it move as an oracle of the fate of battle. In Greece rocking stones occur as funeral monuments, and are generally found on conspicuous places near the sea. Rocking stones are numerous in Yorkshire, Derbyshire, Cornwall, and, Wales. The famous Logan rock, near Land's End, in Cornwall, is computed to weigh over 70 tons. It was wantonly displaced in 1824 by Lieutenant Goldsmith, R. N., and his boat's crew of nine men. He had to replace it at a cost to himself of \$10,000; but whether it has since rocked as well as ever is a mooted point. Near Warton Crag, Lancashire, are no less than seven of these stones; and in Scotland they occur in the parishes of Kirkmichael, Dron, and Abernethy, Perthshire, and Kells, Kirkcudbrightshire. In Ireland they are found in many places; one situated at a place called Islandmagee, on



ROCKING STONE OF TANDIL.

Brown's Bay, County Antrim, is popularly believed to acquire a rocking tremulous motion at the approach of sinners and malefactors. At Andafjord (Faroe Islands) a large block of basalt, measuring some 16 feet in length by 10 feet in breadth, and rising about 10 feet out of the water, swings to and fro with the motion of the sea, which is about seven fathoms deep. All these, however, are as marbles compared with the rocking stone of Tandil in the Argentine Republic, 250 miles S. of Buenos Ayres, for this weighs over 700 tons, yet is so nicely poised that it rocks in the wind and may be made to crack a walnut. See Frank Vincent's "Around and About South America" (1890).

Rock Island, a city in Rock Island co., Ill.; on the Mississippi river, and on the Burlington Route, the Chicago, Milwaukee, and St. Paul, the Rock Island and Peoria, and the Chicago, Rock Island, and Pacific railroads; 80 miles N. W. of Peoria. Here the Mississippi is spanned by a noble wrought-iron railroad bridge which cost \$1,300,000. The city derives its name from a beautiful island in the river, which belongs to the United States, and is used by the Federal government for a great central ar-

Rockland

senal, a large armory and foundry, military headquarters, etc. Before and during the Black Hawk War there were block-house forts on this island, and during the Civil War the prison here was the place of detention of many Confederate prisoners. The city contains waterworks, street railroad and electric light plants, Augustana College and Theological Seminary (Luth.), National and State banks, and daily and weekly newspapers. It has breweries, lumber mills, foundries, machine shops, manufactories of farming implements, soap, glass, stoves, etc., and an assessed property valuation of nearly \$2,500,000. Pop. (1890) 13,634; (1900) 19,493; (1910) 24,335.

Rockland, a city and county-seat of Knox co., Me.; on the W. shore of Penobscot Bay, 10 miles from the Atlantic Ocean, and on the Maine Central railroad; 40 miles S. E. of Augusta. The harbor here is large and has been greatly improved by the construction of a granite breakwater. There is regular steamboat connection with Boston and other ports. The city contains a United States government building, public library, street railroad and electric light plants, waterworks on the gravity system, National and State banks, and several daily and weekly newspapers. The manufacture of lime is the principal industry. Near by are extensive quarries of fine granite of which the postoffices of New York and Cincinnati and the custom house in St. Louis are built. Besides an immense lime industry Rockland has machine shops, foundries, iron and brass works, etc., and an assessed property valuation of nearly \$4,000,000. Pop. (1900) 8,150; (1910) 8,174.

Rock of Chickamauga, a name applied to Gen. George H. Thomas, U. S. A., on account of his heroic stubbornness in holding his position at Chickamauga during the Civil War, in September, 1863. See THOMAS, GEORGE H.

Rock Pigeon, a pigeon that builds its nest in hollows or crevices of rocks and cliffs, especially the *Columba livia*.

Rock River, a river of the United States, which rises in Wisconsin, 50 miles W. of Lake Michigan, and falls into the Mississippi 2 miles below Rock Island city; length, 330 miles, about 225 of which have been ascended by small steamboats.

Rock Salt, common salt, or chloride of sodium, occurring as a mineral and in a solid form. It is always mixed with various impurities. It is found massive or crystallized, its crystals generally cubes, its masses very often either granular or fibrous. It is white, gray, or, owing to the presence of impurities, more rarely red, violet, blue, or striped. For its chemical and other qualities, see SALT. It is a very extensively-diffused mineral, and in some places forms great rock and even mountain masses. A

Rocky Mountains

hill of rock salt near Montserrat, in Spain, is 500 feet high. The island of Ormus, in the Persian Gulf, is formed of rock salt. The Indus, in the upper part of its course, forces its way through hills of rock salt, rising in cliffs 10 feet above the river. In many parts of the world rock salt is found in beds under the soil of other rocks.

Rock Scorpion (*Buthus* or *Scorpio afer*), a species of scorpion found in Africa, averaging about six inches in length. The bite of this animal, though not absolutely fatal, is yet considered to be dangerous.

Rock Snake, a name sometimes given to any individual of the genus *Python*. Rock snakes are among the largest of living reptiles; specimens of 18 and 20 feet long have been brought to the United States, and trustworthy statements of the occurrence of individuals measuring 30 feet are on record; but their size and strength are often much exaggerated. They kill their prey by constriction, and swallow it whole, commencing with the head. During the digestion the animal is lazy and unwilling even to defend itself when attacked.

Rocky Mountains, The, a chain of mountains in the central and W. portions of the North American continent, are a prolongation of the great Mexican Cordillera, extending from the N. frontier of Mexico N. in several ranges, one of which, the E., passing through British North America, reaches the Arctic Ocean in about lat. 70° N.; while the W., passing near the Pacific coast, terminates near Prince William's Sound, in about lat. 60° N. The territory occupied extends from the Californian shores of the Pacific to about lon. 105° W., or it may be considered as extending 125 miles further E., including the Black Hills of South Dakota and Wyoming. The whole area properly included by the mountains and their intervening valleys and desert lands in the country belonging to the United States is estimated at about 980,000 square miles. The mountainous belt of Eastern New Mexico and of the State of Colorado, first met with in crossing the great plains that lie along the headwaters of the rivers which flow S. E. into the Mexican Gulf, and E. toward the Mississippi, has a general N. and S. direction. Santa Fé, N. M., is situated on this belt, and further N. it includes territorially the Spanish peaks. On its E. margin stands Pike's Peak, while in Colorado and Nebraska are those portions of the chain known as the Three Parks, and the Medicine Bow Mountains. From Long's Peak, in about lat. 40°, the range trends N. W., connecting with the Wind River Mountains, which latter includes Fremont's Peak, 13,870 feet above sea-level. Beyond that peak to the N. boundary of the United States the range separates the Dakotas and Washington, and the

pass known as Lewis and Clark's, in lat. 47°, is the most N. pass of its system in the Union, and is the one followed by the Northern Pacific Railroad. In British North America the "Rockies" divide the waters of the Pacific from those which flow into Hudson Bay, as the Saskatchewan, Athabaska, etc., and also from the Mackenzie river, whose outlet is the Arctic Ocean. The next great range of this mountain system toward the W. is that called the Wahsatch Mountains, lying S. from Great Salt Lake, and toward the N. W. this region is traced along the W. bank of the Colorado toward the Sierra Nevada, which forms the E. boundary of California, and the watershed of the Colorado, and Lewis' Fork of the Columbia river, in lat. 37° and 46° respectively. Nearly the whole area between these points, and for a breadth of about 10 degrees of longitude, stretching E. from the Sierra Nevada, is a vast and partially explored territory, from 4,000 to 5,000 feet above sea-level, which receives the streams that fall on the W. slope of the Wahsatch range and on the E. slope of the Sierra Nevada. In British America this section of the chain interlocks with the main trunk of the Rocky Mountains. The W. portion of the chain commences at the S. extremity of the Lower Californian peninsula, then passing through California it bifurcates into two ranges, known, respectively, as the Sierra Nevada, at a distance of about 160 miles from the coast, and the Coast Range, skirting the shores of the Pacific from 10 to 50 miles inland, till it reconnects with the Sierra Nevada in Northern California, in which section Mount Shasta attains an altitude of about 14,000 feet above tide water. Throughout all of Oregon and Washington, the distinction is still maintained between the main range (Sierra Nevada), here called the Cascade Mountains, and the Coast Range. The latter traverses the central portion of Vancouver Island for its whole length, and on the mainland in British Columbia the Sierra Nevada proceeds N. and is crossed by Fraser river. Though the Sierra Nevada in its range between California and Nevada is intersected by no rivers, several of the streams which flow down its E. slopes have their sources high on the summits in the vicinity of those which feed the W. watershed. Several depressions are met with at these points, which serve as passes for the routes from Sonora, Sacramento, and Marysville to the E. By the cañon of Carson river, the range is crossed at an elevation of about 7,250 feet; and by the Truckee Pass the elevation is about 6,000 feet. From these passes the route is N. E. to the main road which crosses the Sierra Nevada in the N. portion of California, and which E. passes by the Humboldt Mountains to Salt Lake City. To the E. of Salt Lake this

route continues across the Wahsatch range to the great South Pass of the Wind River Mountains, immediately S. of Fremont's Peak, and thence down the Sweetwater to the N. fork of the Platte. A more S. route connects Pike's Peak with the Utah basin, and thence turning S. W. crosses the Sierra Nevada near its junction with the Coast Range in Northern California, meeting at this point the route from Santa Fé through New Mexico, and the still more S. one from Texas, which follows the valley of the Gila, and crosses that river and the Colorado at their junction. Mount St. Elias, in Alaska, is one of the highest peaks of this extensively ramified mountain system, though claimed to be surpassed in height by the neighboring Mount Logan. For relative mountain heights, see MOUNTAIN. The mineralogical, geological, and botanical characteristics of the various ranges of the Rocky Mountains' chain are treated in this work under the names of the several States, Territories, and regions with which it has connection. The Rocky Mountains were first partially explored by Lewis and Clark's expedition in 1804. Subsequently explorations were made by Harman, Long, Schoolcraft, Nicollet, Bonneville, and, particularly, by Fremont, and since 1844 quite a number of expeditions have been engaged in the work of further exploration. The Union Pacific Railroad crosses the Rocky Mountains first at Bridger's Pass, in Wyoming, next the Bear Range, before reaching Salt Lake City, and the Sierra Nevada, to the W. of Carson City, near the frontier of Nevada and California.

Rocky Mountain Goat, the *Aplocerus*, a beautiful animal of the antelope family, which inhabits the heights of the Rocky Mountains between the forests and the snow line, from the 44th to the 65th degree of latitude. It is about the size of a goat, but is handsomer and more thickset, and has stronger legs. It is completely covered with long, thick, white hair, which forms an erect mane along the middle of the back from between the horns to the root of the tail. Though it is hunted by the trappers, its flesh is not valued as food. The above species and the prong-horned antelope (*Antilocapra*) are the only antelopes which occur in the New World.

Rococo, or **Rocaille**, a name given to the very debased style of architecture and decoration which succeeded the first revival of Italian architecture. It is ornamental design run mad, without principle or taste. The ornament consists of panels with their moldings broken or curved at the angles, and filled with leafage, shell-work, musical instruments, marks, etc. This style prevailed in Germany and Belgium during the 18th century, and in France from the time of Henry IV. to the Revolution.

Rocroi

Rocroi, or **Rocroy**, a small fortified town of France, department of Ardennes, near the Belgian frontier; celebrated for the victory gained (1643) by the Duke d'Enghien (afterward the great Condé) over the Spaniards.

Rod, called also a pole, or perch, a measure of length, equivalent to $5\frac{1}{2}$ yards, or $16\frac{1}{2}$ feet. The square rod, called generally a rood, is employed in estimating masonry work, and contains $16\frac{1}{2} \times 16\frac{1}{2}$, or $272\frac{1}{4}$ square feet.

Rod, Edouard (rod), a French novelist and critic; born in Nyon, in 1857. He published many works of criticism and erudition, among them being: "À propos de 'L'Assommoir'" (1879); "The Germans at Paris" (1880); and "Wagner and the German Æsthetic" (1886). But he is better known as a novelist, and has published: "The Fall of Miss Topsy" (1882); "The Deathward Career" (1885); "The Meaning of Life" (1889); "Stendhal" (1891); and "The Sacrificed One" (1892), etc.

Rodbertus, Johann Karl (known as **RODBERTUS-JAGETZOW**), a German political economist; born in Greifswald, Pomerania, Aug. 12, 1805. He is regarded by many as the founder of scientific socialism. He maintains that "all commodities can only be considered economically as the product of labor, and cost nothing but labor." His most important works are: "A Contribution to the Knowledge of Municipal Conditions" (1842); "Social Letters to Von Kirchmann" (1850-1851), published later under the title of "Capital" (1888); "Exposition and Defense of the Existing Credit Note Based upon Real Estate" (1868-1869); "The Normal Working-Day" (1871); "Letters and Politico-Social Theorems of Dr. Rodbertus-Jagetzow" (1884). He died in Jagetzow, Dec. 6, 1875.

Rodd, Sir James Rennell, an English diplomatist; born in London, England, Nov. 9, 1858; was educated at Haileybury College, and at Balliol College, Oxford, England, where he won the Newdigate Prize. He was attaché in the diplomatic service to Berlin in 1883; to Athens in 1888; second secretary to Rome in 1891, and in Paris in 1892. He was in charge of the British Agency at Zanzibar in 1893, was transferred to Cairo in 1894 and was special envoy to King Menelik in 1897. He published: "Poems in Many Lands" (1883); "Feda and Other Poems" (1886); "The Unknown Madonna and Other Poems" (1888); "Frederick, Crown Prince and Emperor" (1888); etc.

Rodenbach, George, a Belgian poet; born in Tournay, Belgium, July 16, 1855. He became noted for the delicacy of his poetic sentiment and the grace of his lines. His great piece is "Belgium" (1880), a

Rodentia

historical poem; and he has also written: "The Fireside and the Fields" (1877); "Sorrows" (1879); "The Beautiful Sea" (1881); "The Winter of Fashion" (1884); "White Youth" (1886); "Silence" (1888); "Art in Exile" (1889); "The Reign of Silence" (1891); and one romance, "Bruges la Morte" (1892).

Rodenberg, Julius, a German poet; born in Rodenberg, Hesse-Nassau, June 26, 1831. He substituted for his own name, Levy, that of his birthplace. He published accounts of his extensive travels in France, England, Italy, and Belgium, and wrote poems of diverse kinds—epic, heroic-comic, lyrical, dramatic, and opera librettos. His works include: "Journalistic Life in London" (1859); "Paris by Daylight and Gaslight" (1867); "An Educational Tour in England" (1873); "Pictures of Berlin Life" (1885-1888); and the romances "The Singer of London's Streets" (1863); "The New Deluge" (1865), translated into many languages; and "By the Grace of God" (1870); "The Grandidier" (1878).

Rodentia, or **Rodents**, an order of mammiferous quadrupeds occupying in many respects an intermediate place between the purely carnivorous and purely herbivorous mammalia, and so forming the connecting link between them. The order embraces rats and mice, hares, rabbits, guinea pigs, and other well-known animals. These animals have two great incisor teeth in each jaw, separated from the molars by a wide space, with which they could hardly seize a living prey or rend flesh; they could not even cut aliments, but they might serve for reducing them, by continued labor, into fine molecules—in a word, by gnawing them; whence the term rodents, or gnawers, applied to this order. The characteristic of this order is that the lower jaw has no horizontal movement except from behind forward, and vice versa, convenient for the action of gnawing; the molars of the *Rodentia*, consequently, have flat crowns, the enamelled eminences of which are always transversal, so as to be in opposition to the horizontal movements of the jaw, and to be better adapted for trituration. The hinder parts of the body of the rodents in general exceed their anterior. The brain of the rodents is nearly smooth and without convolutions; the eyes are entirely directed laterally; the jaws are weak, and the forearms have scarcely any rotary motion, and their two bones are nearly united. In the greater part of the details of their organization the inferiority of the animals is displayed; but some of them enjoy a certain dexterity, using their forefeet for carrying their food to their mouth; while others again (the squirrels) climb trees with facility. Rodents are most abundant in temperate regions. In North America there are 99 spe-

Roderic

cies, 19 genera; 81 species, 16 genera in Europe and the N. of Asia; in Africa, 53 species, 16 genera; in India and its islands, 58 species, 10 genera; in South America and West India Islands, 89 species, 25 genera.

Roderic, "the last of the Goths," whose tragic death, coincident with the downfall of the Visigothic monarchy in Spain, has inspired poets and romancers (Scott, Southey, Geibel, Dahn) to throw round him a halo of glory. According to the commonly accepted legend he was the son of a noble who was blinded by King Witiza. A conspiracy having been formed against the hated Witiza by the clergy and the nobles of Roman blood, Roderic was elevated to the throne (710). The sons of Witiza, however, bided their time, meanwhile submitting to the usurper. At length certain malcontent nobles were engaged in a plot to dethrone Roderic by Count Julian, the governor of Ceuta (in North Africa), whose daughter had been outraged by the Visigothic king. Julian brought over with him a Moorish chief named Tarik at the head of 12,000 men. Roderic met the invading army on the banks of the Guadelete, near Xeres de la Frontera, on July 26, 711. The battle raged six days; but the sons of Witiza, who commanded the wings of the Christian army, deserted during the contest, and the rout of the Visigoths was complete. Roderic either died on the field or was drowned in the Guadalete while attempting to swim his horse across. A third version, however, relates that he escaped and passed the rest of his life as a pious hermit. By this victory the Arabs became masters of Southern Spain.

Rodez, a town of Southern France (department Aveyron); on a bold bluff encircled by the Aveyron, 148 miles N. W. of Montpellier. The Gothic cathedral (1277-1535) has a tower, 260 feet high, crowned by a colossal image of the Virgin. There are several mediæval houses, remains of a Roman amphitheater, and a restored Roman aqueduct. Coal mining, cloth making, tanning, and cattle dealing are the principal occupations.

Rodger, Alexander, a Scotch poet; born in Mid-Calder, Midlothian, July 16, 1784. He began as a humble hand-loom weaver, and wrote some of his best lyrics while inspector of cloths in Glasgow. His style is somewhat rough, but easy and vigorous. His books include: "Scotch Poetry, Songs, Odes, Authors, and Epigrams" (1821); "Poems and Songs, Humorous and Satirical" (1838); "Stray Leaves from the Portfolios of Alisander the Seer, Andrew Whaup, and Humphrey Henkecke" (1842); and others. His best-known poems are: "Robin Tamson's Smiddy" and "Behave Yoursell before Folk." He died in Glasgow, Sept. 26, 1846.

Rodman

Rodgers, Christopher Raymond Perry, an American naval officer; born in Brooklyn, N. Y., Nov. 14, 1819. In 1833 he entered the United States navy as a midshipman; was in active service during the Seminole and Mexican Wars; and in 1861 became commander. In that year, in the "Wabash" of Admiral Dupont's squadron, he was fleet-captain at the battle of Port Royal. He commanded, in 1862, an expedition to St. Augustine and up the St. Mary's river. In the attack on the defenses of Charleston, April 7, 1863, he was fleet-captain on the "New Ironsides." He was appointed superintendent of the United States Naval Academy in 1874, 1877, and 1881, and in the same year was promoted rear-admiral. He was retired in 1881; and died in Washington, D. C., Jan. 8, 1892.

Rodgers, John, an American naval officer; born in Harford co., Md., July 11, 1771; son of a Scotch colonel of militia. He was a captain in the merchant service by 1789, and in 1798 entered the navy as lieutenant, becoming captain the year after. In 1805 he extorted from Tripoli and from Tunis treaties abolishing the former tribute and forbidding the slavery of Christian captives. On June 23, 1812, he fired with his own hand the first shot in the war with Great Britain, and during the war he took 23 prizes. He died Aug. 1, 1838.

Rodgers, John, an American naval officer; born in Maryland, Aug. 8, 1812. He entered the naval service in 1825, and soon showed that he had inherited the bravery of his father, Commodore John Rodgers. He was in the war against the Seminole Indians and rendered excellent service during the Civil War. In November, 1861, he took part in the battle of Port Royal, and in November, 1862, he led an attack on Drury's Bluff, on the James river, in which he was repulsed. He commanded the "Weehawken" in the attack on Fort Sumter, in April, 1863, and in the same year he captured the Confederate ironclad "Atlanta," near Savannah. The Secretary of the Navy tendered compliments to him for "these serviceable and heroic acts." He was promoted rear-admiral in 1871, and in 1877-1882 was superintendent of the United States Naval Observatory. He died in Washington, D. C., May 5, 1882.

Rodin, Auguste, a French sculptor; born in Paris, France, in 1840, studied under Barye, and began to exhibit in the Salon in 1875. He has produced great scriptural and symbolical groups, but is best known by his portrait busts and statues, notably the busts of Victor Hugo and Balzac; though his "Apollo," "Young Girl," "The Kiss," and his panels are equally great.

Rodman, Isaac Peace, an American military officer; born in South Kingston, R. I., Aug. 18, 1822. He entered the Union

Rodman

army; was captain in 1861, and the same year led his company in the battle at Bull Run, July 21. He was soon promoted to colonel and was at the capture of Roanoke Island and at Newbern, N. C. In 1862 he was promoted Brigadier-General of volunteers. He commanded a division at Fredericksburg. In 1862 he was engaged in the battle of Antietam, where he received a wound from which he died in Sharpsburg, Md., Sept. 30, 1862.

Rodman, Thomas Jefferson, an American military officer; born in Salem, Ind., July 30, 1815. He became famous as the inventor of the cannon bearing his name. He died in Rock Island, Ill., June 7, 1871.

Rodney, Cæsar, an American patriot; born in Dover, Del., Oct. 7, 1728. In 1775 he was made sheriff of Kent co., Del., and at the expiration of his term became justice of the peace and judge of all the lower courts. In 1765 he was a delegate to the Stamp Act Congress in New York. In 1767, when the tea act was proposed in the British Parliament, the Delaware Assembly appointed him to aid in the formulation of an address of remonstrance to the king. In 1775 he was elected for a second time to the Continental Congress, and in May of that year became Brigadier-General of the Delaware militia. He served with distinction during the Revolutionary War under Washington, becoming, in 1777, a Major-General. He was elected president of Delaware, in which office he served till 1782, when he was re-elected to Congress, but did not take his seat because of illness. As a public man he displayed great integrity and elevation of character. He died in Dover, Del., June 29, 1784.

Rodney, George Brydges, Lord, an English naval officer; born in Walton-upon-Thames, England, Feb. 19, 1708. He was created rear-admiral in 1759, and distinguished himself in several expeditions. In 1780 he defeated the Spanish fleet and took several ships. This was followed soon after by a more splendid victory, and the capture of the Spanish admiral, Don Juan de Langara. But the most important achievement of this brave admiral was the defeat of the French fleet under Count de Grasse in the West Indies in 1782, when the French admiral and a number of his ships were taken. He died in London, May 24, 1792.

Rodolph. See RUDOLF.

Rodriguez, or Rodrigues, a hilly volcanic island (1,760 feet), 18 miles long by 7 broad, 380 miles E. by N. of Mauritius, of which it is a dependency, being one of the Mascarene group. The soil is fertile, and agriculture is the chief occupation. Hurricanes often cause great damage to the island, which is encircled by a coral reef. It was discovered by the Portuguese in 1645,

Roe

and has been a British colony since 1814. The chief port is Port Mathurin. Owing to its isolation this island is particularly interesting to the botanist and the zoölogist. Till near the close of the 17th century it was the home of the solitaire, now an extinct bird.

Roe (*Capreolus caprea*), a small species of deer inhabiting Europe and some parts of Western Asia, chiefly in hilly or mountainous regions which are covered with forests or with scattered bushes and heath. It is seldom found in the higher and more naked mountain tracts, the haunt of the stag or red deer. It was once plentiful in Wales and in the hilly parts of England, as well as in the S. of Scotland, but is now very rare S. of Perthshire. The roe is about 2 feet 3 inches in height at the shoulder. Its weight is about 50 or 60 pounds. Its color is a shining tawny-brown in summer, more dull and grizzled in winter; on the under surface and around the tail the color is whitish, but there is considerable variety. The hair is longer than in many deer. The tail is very short, concealed among the hair.



ROEBUCK.

The antlers, which are peculiar to the male or roebuck, are eight or nine inches long, erect, round, very rough, longitudinally furrowed; having, in mature animals, two or three tines or branches, which, as well as the tip of the horn, are sharp-pointed, so that the antlers form very dangerous weapons. The habits of the roe are somewhat like those of the goat, or even of the chamois. It keeps its footing on rocks with great security, bounds very actively, and takes great leaps. Its usual pace, when not very hard pressed, is, however, a kind of canter. It is not gregarious, not more than a buck and doe with one or two fawns being usually seen together. Contrary to what is usual among deer, the male and female remain attached during life. The voice of the roe-deer, resembling that of a sheep, but shorter and more barking, is often heard through the night. The males are very combative at the breeding season. The roe browses on the tender shoots of trees and bushes as well as on herbage, and is thus very injurious to young woods. It is never very thorough-

ly tamed, and when partially so is apt to become mischievous, and the male dangerous. The venison is superior to that of the stag, but not equal to that of the fallow deer. The horns are used for handles of carving knives and similar articles.

Roe, Azel Stevens, an American novelist; born in New York city, Aug. 16, 1798. He left the wine business for the production of literature, attaining considerable success. He wrote: "James Mountjoy" (1850); "To Love and be Loved" (1852); "Time and Tide; or Strive and Win" (1852); "A Long Look Ahead" (1855); "The Star and the Cloud" (1856); "True to the Last" (1859); "How Could He Help It?" (1860); "Looking Around" (1865); "Woman Our Angel" (1866); "The Cloud in the Heart" (1869); "Resolution" (1871); and "True Love Rewarded" (1877). He died in East Windsor Hill, Conn., Jan. 1, 1886.

Roe, Charles Francis, an American military officer; born in New York city, May 1, 1848; was graduated at the United States Military Academy in 1868, and was assigned to the 1st Cavalry, then on the Pacific slope. He was post-adjutant at Camp Harney, Or., under the late Major Elmer. Orders came which it was necessary to transmit to Fort Bidwell, Cal., to prevent an Indian outbreak. The nearest station on the way was Camp Warner, 150 miles distant, and the road lay through an alkali country. Roe volunteered to carry the dispatches, and a sergeant and a private were detailed to accompany him. They started after half an hour's preparation. They rode the regular cavalry horses, weighing about 1,000 pounds. Roe weighed about 180 pounds at that time. They were given 36 hours to reach Camp Warner. They made the camp in exactly 24 hours, of which 22½ were passed in the saddle.

In the fall of 1870 Roe was transferred to the 2d Cavalry, and that winter he was mustered out, owing to reorganization. The next year he was reappointed to the same regiment. At the time of the Custer battle on the Little Big Horn, Roe was with Terry's force and was ordered by that officer to go ahead of the column and establish communication with Custer at Tullock's Fort. But the day before Roe left Terry, Custer and his men had been wiped out. In January, 1888, he returned to New York, and the following year was made captain of the newly organized Troop A, which he made known from one end of the country to the other. When the troop was increased to a squadron, Roe was made major of it, and held that position till the reorganization of the National Guard of New York, when he was made Major-General. In 1898 he was appointed a Brigadier-General of United States volunteers by the President.

Roe, Edward Payson, an American novelist; born in Orange co., N. Y., March 7, 1838. He wrote a great number of very popular novels, which were republished in England and other countries. His first novel, "Barriers Burned Away" (1872), met with immediate success, and was followed by "What Can She Do?" (1873); "The Opening of a Chestnut Burr" (1874); "From Jest to Earnest" (1875); "Near to Nature's Heart" (1876); "A Knight of the Nineteenth Century" (1877); "A Face Illumined" (1878); "A Day of Fate" (1880); "Without a Home" (1880); "His London Rivals" (1883); "A Young Girl's Wooing" (1884); "Nature's Serial Story" (1884); "An Original Belle" (1885); "Driven Back to Eden" (1885); "He Fell in Love With his Wife" (1886); "The Earth Trembled" (1887); "A Hornet's Nest" (1887); "Found, Yet Lost" (1888); "Miss Lou" (1888); and "Taken Alive, and Other Stories." He died in Cornwall, N. Y., July 19, 1888.

Roe, Edward Thomas, an American lawyer; born in Shawneetown, Ill., Nov. 28, 1847; was educated at the Illinois Wesleyan University and the University of Albany; began the practice of law at Bloomington, Ill., in 1870; appointed assistant to the United States attorney for the Southern District of Illinois in 1871, and served in that capacity and as United States district attorney for 16 years. His publications include: "Preliminary Practice in the Courts of the United States," "Criminal Procedure of United States Courts," "A Pronouncing Dictionary of Biography," "The Modern Webster Dictionary," etc.

Roe, Francis Asbury, an American naval officer; born in Elmira, N. Y., Oct. 4, 1823; appointed an acting midshipman, Oct. 19, 1841; ordered to the sloop-of-war "John Adams," and served a full cruise on the coast of Brazil and S. and E. coast of Africa; afterward served on other war vessels in various parts of the world; on the breaking out of the Civil War he was ordered to the "Pensacola," was executive officer of that ship at its memorable passage down the Potomac river, through 9 miles of batteries, under constant fire. He took the "Pensacola" to New Orleans, led the star-board (van) column of Farragut's fleet at the battle and passage of Forts Jackson and St. Philip, and 80 miles above the Chalmette Forts. He was specially commended for good conduct on this occasion by Commodore Henry Morris, and recommended for promotion to commander. He was detached from the "Pensacola," at New Orleans, Aug. 5, 1862, and ordered to command the gunboat "Katahdin," and the same day fought the battle of Baton Rouge against John C. Breckenridge. He was

Roebling

promoted lieutenant-commander, Aug. 6, 1862. Subsequently he was ordered to the Sounds of North Carolina, where he engaged, in command of the "Sassacus," in an action with the Confederate ram "Albemarle" and the gunboat "Bombshell." The battle took place on May 5, 1864, in Albemarle Sound. Ramming disabled the "Albemarle," and she retreated, leaking badly, up the sound to Plymouth, N. C. To keep from sinking, the ram was run aground at a spot near Plymouth. The "Bombshell," a small gunboat, surrendered to the "Sassacus" in the first of the engagement. Roe was promoted captain April 1, 1872, and rear-admiral, Nov. 3, 1884, and was retired Oct. 4, 1885. He died in Washington, D. C., Dec. 28, 1901.

Roebling, John Augustus, an American engineer; born in Muhlhausen, Prussia, June 12, 1806; came to the United States in 1831, and settled in Pittsburg, Pa. His first work was as assistant engineer on the dock navigation of Beaver river, a tributary of the Ohio. He soon found employment in the Pennsylvania State service, and for three years was engaged in surveying and locating three railroads from Harrisburg to Pittsburg across the Allegheny Mountains. These roads were in due course built by the Pennsylvania Railroad Company. In 1844 he secured the contract to remove the wooden aqueduct of the Pennsylvania canal across the Alleghany river, which had become unsafe and to replace it with a new structure. He carried this contract through successfully though the limited time of nine months included the winter season of 1844-1845. His next piece of construction was the Monongahela suspension bridge at Pittsburg. He then, within two years, built a series of five suspension aqueducts on the line of the Delaware and Hudson canal, connecting the Hudson river with the anthracite coal regions of Pennsylvania. He removed from Pennsylvania about this time, to Trenton, N. J., where he established his wire works. He was invited to make plans and estimates for building a suspension bridge across the chasm of the Niagara river to unite the New York Central and Great Western (Canada) railroads. He secured the contract and in four years from beginning work (1851), the first locomotive and train crossed the bridge, in March, 1855. He began the Cincinnati suspension bridge in 1856 and completed it in 1867. His greatest work, the crowning triumph of a brilliant course of suspension bridge building, was the bridge over the East river, connecting New York and Brooklyn. He died while the construction was in progress, in Brooklyn, July 22, 1869, and the bridge was completed by his son.

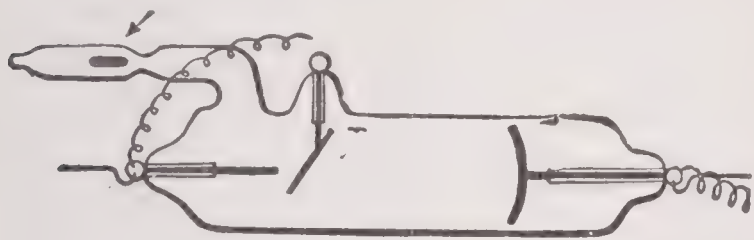
Roentgen

Roebling, Washington Augustus, an American civil engineer; born in Saxenburg, Pa., May 26, 1837; son of the preceding. He was graduated at the Rensselaer Polytechnic Institute, Troy, N. Y., in 1857; was an engineer officer during the Civil War and attained the rank of colonel of volunteers. In 1865 he resigned from military service to become assistant to his father in constructing the suspension bridges at Cincinnati and Pittsburg. In 1869 he was assistant engineer under his father in the construction of the suspension bridge over the East river; and on his father's death became chief engineer, which post he held till the completion of the bridge in 1883. He then became superintendent of the large wire manufactory at Trenton, N. J. He published many valuable engineering reports, notably several relating to the construction of the East river bridge.

Roebuck, John Arthur, an English statesman; born in Madras, Spain, in December, 1802, but passed his youth in Canada. Going to England in 1824, he was in 1831 called to the bar at the Inner Temple, and in 1832 elected as a Radical reformer for Bath to the House of Commons. He represented Sheffield from 1849 to 1868, and again from 1874 till his death. The vigorous nature of his political warfare earned him the popular nickname of "Tear 'em." His greatest political triumph was the moving of a motion for inquiring into the condition of the army before Sebastopol in January, 1855, which he carried by a large majority, causing the fall of the administration of the Earl of Aberdeen. He was appointed chairman of the committee which conducted the inquiry moved for. During the Civil War in the United States he favored the Confederates. He supported Beaconsfield's policy during the Eastern crisis in 1877-1878, and in 1879 was called to the privy-council. He wrote a work on the "Colonies of England," and "History of the Whig Ministry of 1830." He died Nov. 30, 1879.

Roentgen, William Conrad, Baron, a German scientist; born in Holland in 1845; was graduated in medicine at the University of Zurich in 1870, and accompanied Professor Kundt, his teacher, to Würzburg, where he engaged in practice. He went to Strasburg, in 1873, as assistant professor, and for 20 years was conspicuous as Professor of Mathematics and Physics, and also as a scientist. On Nov. 8, 1895, he made the discovery of what has since been known as the Roentgen, or X-rays. The German emperor bestowed the Order of the Royal Crown on the discoverer, who afterward also received from Prince Ludwig of Bavaria the title of baron. See ROENTGEN RAYS.

Roentgen, or Röntgen, Rays, certain invisible non-refractible rays emanating from the surface of an electrically excited vacuum tube opposite the cathode electrode, having power (1) of permeating objects impervious to light or heat rays, (2) of discharging electrified bodies or surfaces exposed to them, (3) of exciting fluorescence in fluorescent salts, and (4) of affecting sensitized photographic plates in a manner similar to light rays. They were discovered by William Conrad Roentgen, Professor of Physics at the Royal University of Würzburg, in Germany, toward the close of the year 1895. Not being certain as to the nature of the rays, Professor Roentgen provisionally termed them the X-rays, and they are still commonly known by that name, though the



ROENTGEN RAYS APPARATUS.

name Roentgen rays is also common. At the beginning of 1894 Prof. Paul Lenard, at Bonn, announced the discovery that by using a Crookes tube in which the cathode rays were made to impinge on a thin sheet of aluminum a screen covered with a phosphorescent substance outside the tube could be made to phosphoresce by their action. That, further, it was possible by means of these cathode rays, as he supposed, to obtain "shadows" of objects through optically opaque substances and to produce an impress of these "shadows" on photographic plates, which could afterward be developed and fixed by ordinary photographic processes. Working on this line of investigation Professor Roentgen inclosed an excited vacuum tube in blackened cardboard treated with barium platino-cyanide, and discovered that the cathode beam is accompanied by certain rays not before known, which, though of phosphorescent and photographic quality, differ from any known form of light in not being susceptible of refraction.

These were the wonderful X-rays, which have opened up to the world a new region of scientific exploration. Besides obtaining radiographs of the bones in the living human hand, Professor Roentgen radiographed a compass card completely inclosed in a metallic box. From these and similar experiments he inferred that these newly discovered rays generated in the neighborhood of the Crookes tube by the electric disturbance set up by the passage of a current possessed the property of passing through all bodies in their path, and that some bodies, being less permeable than others,

cast a shadow. Subsequent experiments have established the fact that the transparency of a body to the X-rays is proportional to its density. As to the real nature of the X-rays eminent physicists differ, but all agree that they must be regarded as of a nature essentially different from ordinary light. They cast an invisible life-size shadow of the objects that obstruct their passage, which invisible shadow if received on a surface which phosphoresces or glows under their action becomes a visible shadow, which makes the wonderful revelations of the fluoroscope possible. If this invisible shadow is received on a sensitive plate, the plate is impressed, and on subsequent development the representation of the obstructing object is perpetuated on the photographic plate.

The Roentgen rays pass very freely through the various tissues and fluids of the body, but are obstructed by the bones; hence it is possible to take a perfect shadow-picture, or radiograph, as it is now generally called, of the bones of a living person or animal. By far the most important result of the discovery has been the application of the new rays to surgery. Radiographs of bones fractured, splintered, or diseased, have been of much practical use in aiding diagnosis and treatment. Attempts more or less successful have also been made to radiograph internal organs and tissues other than bones. Needles, bullets and other foreign objects in various parts of the body have been successfully located, and the invention of the FLUOROSCOPE (*q. v.*) has made it possible to use the Roentgen rays, not only in surgical cases, in searching for fractures, etc., but to undertake anatomical studies and make the diagnosis of internal diseases. The full physiological effects of the X-rays are not yet clearly understood. Experiments show that long exposure to the rays causes acute maladies of the skin and also baldness, and in some instances legal proceedings have been brought for damages thus occasioned to patients while undergoing X-ray treatment.

A very interesting and practical application of the rays was made at Pittsburg, Pa., early in March, 1897. By means of a very powerful X-ray apparatus, designed by Prof. Reginald A. Fessenden of the Western University of Pittsburg, tests were made that prove that blow holes in heavy armor can be detected by the aid of radiography. It was reported that with the aid of the fluoroscope a slab of steel four inches thick was pierced by the eye, and that perfect radiographs were produced through sheets and articles of steel. Ever since Roentgen made his discovery scientific investigators throughout the world have been actively at work on the nature and character of the rays generated by the electrically excited

Roe Stone

vacuum tube, and Prof. E. Friedrich, of the Vienna Academy of Sciences, claims to have discovered certain "black rays" which he terms Kritic rays, or critical rays, that reveal with absolute reliability the entrance of death into the body. In his letter addressed to the Imperial Academy of Science, in January, 1897, he said: "The Kritic rays are directed out of a vacuum tube and are so piercing that they immediately penetrate the body on which, for the purposes of experiment, the investigator has turned them. The rays produce on the photographic plate images which are of a different character according as they are taken of a living or a dead body. The photographing of a hand is the easiest experiment in test work of this kind. If, when it is laid on the photographic plate and subjected to the Kritic rays, it appears as the living hand does under the Roentgen rays, viz., with all the bones distinguished, then beyond question the person is alive. If, however, the hand does not yield its characteristic form under this process the person to whom it belongs is undoubtedly dead." As to the value of Professor Friedrich's representations time and experience must determine.

Roe Stone, a name locally given to those limestones which are formed of small globules like the roe of fishes. It has been translated into the scientific term *Oölite*.

Rogation Days, the Monday, Tuesday, and Wednesday before Holy Thursday or Ascension Day, so called from the supplications or litanies which are appointed in the Roman Catholic Church to be sung or recited in public procession by the clergy and people. In England, after the Reformation, this practice was discontinued, but it survives in the custom (observed in some places) of perambulating the parish boundaries.

Roger I., Count of Sicily, the youngest of the 12 sons of Tancred de Hauteville of Normandy; born in that duchy in 1031. When 27 years of age he joined his famous brother Robert Guiscard in South Italy; but at first he seems to have fought against Robert more than he helped him. At length they became reconciled, and Roger helped Robert to complete the conquest of Calabria. In 1060 Roger was invited to Sicily to fight against the Saracens: he took Messina and settled a garrison there. Everywhere the Normans were welcomed by the Christians of Sicily as their deliverers from the Moslem yoke, and they won town after town, till in 1071 the Saracen capital, Palermo, was captured. Robert then invested Roger with the countship of Sicily. Count Roger spent the rest of his life, apart from his numerous expeditions undertaken for the support of his brother, in completing the conquest of Sicily, which was finally effected

Rogers

in 1090. Already as early as 1060 Duke Robert had given his brother the half of Calabria, with the title of count. After Robert's death (1085) Roger succeeded to his Italian possessions, and became the head of the Norman power in Southern Europe. Pope Urban II. granted him special ecclesiastical privileges, such as the power to appoint the bishops, and made him papal legate of Sicily (1098). Roger died in Mileto, Calabria, in June, 1101.

Roger II., King of Sicily, second son of the preceding; born in 1096. When he came of age he executed his task of governing Sicily with great ability and courage, and his sway was gradually extended over a great part of Southern Italy. By the Anti-Pope Anacletus in 1130 he was honored with the title of king. In spite of repeated revolts of the barons, and though the German Emperor Lothair and the Greek Emperor Emmanuel were leagued against him, and Innocent II. excommunicated him, he defended himself with success and defeated the Pope's forces at Galluzzo, taking Innocent prisoner. Peace was made, the Pope annulled all excommunication against Roger, and recognized his title of king. Roger afterward fought with success against the Greeks, took Corfu, and gained part of the N. coast of Africa. He died in 1154, and was succeeded by a son and a grandson.

Rogers, Henry, an English essayist and reviewer; born in St. Albans, England, Oct. 18, 1806. Though he was neither philosopher nor theologian, his writings hovered between philosophy and theology, and were widely read. They include: "Life and Character of John Howe" (1836); "General Introduction to a Course of Lectures on English Grammar and Composition" (1838); "The Eclipse of Faith" (1853), a piece of clever dialectics which had great vogue with the religious public of his day; "Reason and Faith" (1866); "The Superhuman Origin of the Bible" (1873); and two series of "Essays" (1850-1855). He died in North Wales, Aug. 20, 1877.

Rogers, Henry J., an American inventor; born in Baltimore, Md., in 1811. He devised the Rogers code of flag signals adopted by the United States navy in 1846, and invented the first pyrotechnic system of signals ever used in the United States. He was associated with Samuel F. B. Morse in the construction of the first telegraph line in the United States, between Washington and Baltimore, in 1844. Subsequently he invented several important telegraphic instruments, and was one of the incorporators of the Magnetic Telegraph Company, the first in the United States, in 1845. He was also associated with the American Telegraph Company, and was superintendent of the Western Union, the

Rogers

Bankers' and Brokers', and the Southern and Atlantic lines. In the Civil War he was an acting master in the navy. He was the author of "The Telegraph Dictionary and Seaman's Signal Book," "The American Code of Marine Signals"; etc. He died in Baltimore, Md., Aug. 20, 1879.

Rogers, Jacob S., an American manufacturer; born in Paterson, N. J.; was president of the Rogers Locomotive and Machine Works in that city. He bequeathed his estate to the Metropolitan Museum of Art in New York city. After a contest, a compromise was made with the heirs, under which the amount to go to the museum was about \$5,500,000. He died July 2, 1901.

Rogers, James Edwin Thorold, an English economist; born in Hampshire, England, in 1823; was Professor of Political Economy at Oxford, and will be remembered as a historian of economics. His principal work is "The History of Agriculture and Prices in England" (1866-1888), of which "Six Centuries of Work and Wages" (1885) is an abridgment. Among his other writings are: "Cobden and Modern Political Opinion" (1873); "The First Nine Years of the Bank of England" (1887); "The Economic Interpretation of History" (1888); and "The Industrial and Commercial History of England" (1892). He died in Oxford, Oct. 13, 1890.

Rogers, John, an American sculptor; born in Salem, Mass., Oct. 30, 1829; was a machinist in early life; developed a talent in clay modelling; and in 1858 went to Europe to study plastic art, and while there was under the instruction of the best masters in Paris and Rome. He returned to the United States in 1859, and afterward produced a large number of statuettes in clay of a new composition. His first group, "The Checker Players," attracted popular attention. He became noted for statuette groups, his genius being unconventional, singularly original, and attractively simple in its harmony with nature. Many of these groups pertain to the Civil War and are known as "Rogers's Groups." "The Town Pump," "The Charity Patient," "The Country Postoffice," elicited, with other every-day scene groups, popular approval. He also executed the equestrian statue of General Reynolds, now at the city hall in Philadelphia. He died July 26, 1904.

Rogers, Randolph, an American sculptor; born in Waterloo, N. Y., July 6, 1825; studied art in Europe in 1848-1850, spending most of the time in Rome. He then returned to the United States; for five years had a studio in New York, and established himself in Rome in 1855. He executed the bronze doors of the National Capitol at Washington, D. C., and also sev-

Roget

eral portrait statues and memorial monuments in Providence, Richmond, Detroit, and other cities. He produced busts that became famous, "Nydia," "Isaac," "Ruth," etc. His work was classed as "ideal." He died Jan. 15, 1892.

Rogers, Robert, an American author; born in Dunbarton, N. H., in 1727; commanded during the French and Indian War (1755-1763) the celebrated corps known as "Rogers's Rangers." Later he published in England: "A Concise Account of North America" (1765); "Journal of Major Robert Rogers" (1765); and "Ponteach (Pontiac); or, the Savages of America," a tragedy in blank verse, copies of which are now very rare. He also left in MS. "A Diary of the Siege of Detroit in the War with Pontiac," first published in 1860. He died in England in 1800.

Rogers, Samuel, an English poet; born in Newington Green, London, July 30, 1763. His wealth, liberality, and social qualities gave his productions a great vogue. His best poem is the "Pleasures of Memory" (1792), which passed through 15 editions. He wrote also: "The Voyage of Columbus" (1812); "Jacqueline" (1813); "Human Life" (1819); and "Italy" (1822) — all highly prized for their



SAMUEL ROGERS.

exquisite illustrations. He was the intimate friend of nearly all the literary men of his time in Great Britain. He died in London, Dec. 18, 1855.

Roger Williams University, a coeducational institution for colored students in Nashville, Tenn.; founded in 1863 under the auspices of the Baptist Church; has preparatory, collegiate, normal, and theological departments; requires daily manual labor of students; derives its income wholly from tuition fees and benefactions; has grounds and buildings valued at \$300,000; average faculty, 15; average students, 350.

Roget, Peter Mark, an English physician; born in London, England, Jan. 18, 1779; was educated at Edinburgh; became physician to the Manchester Infirmary in 1804; and in 1808 settled in London, where he became physician to the Northern Dispensary; F. R. S. (1815), and afterward for nearly 20 years its secretary; Fullerian Professor of Physiology at the Royal Insti-

tution; and an original member of the senate of the University of London. He wrote one of the "Bridgewater Treatises"—"On Animal and Vegetable Physiology Considered with Reference to Natural Theology" (1834), and the more famous "Thesaurus of English Words and Phrases" (1852). He died in Malvern, Sept. 17, 1869.

Roggeveld Mountains, a range in the S. W. division of Cape Colony, running N. W. to S. E. with an average height of 5,000 feet.

Rogue, an idle, slothful, inactive person; in the legal sense, a vagrant; a vagabond; a sturdy beggar. A knave; a rascal; a wilfully dishonest person; a cheat; a trickster. A name of slight tenderness or endearment for one who is mischievous or frolicsome; as, a wicked rogue (in irony).

Rogue Money, an assessment formerly levied on every county in Scotland "for defraying the charges of apprehending criminals, or subsisting them when apprehended, and of carrying on prosecutions against them." This tax was first imposed by a statute of George I., on the assertion that criminals were in the habit of escaping punishment for lack of the funds necessary to bring them to justice. The freeholders in each shire were directed to fix the assessment at any of the head courts yearly, and to appoint collectors. By an act of Victoria rogue money in the shires was abolished, and in lieu thereof power was conferred on the Commissioners of Supply to levy by rate a "County General Assessment." By the Local Government (Scotland) Act, this power of the Commissioners of Supply is now vested in the locally elected county councils. It is to be observed, however, that the repealed portions of the former act do not include section 10, which reserves the existing right of any burgh to levy rogue money.

Rohan, Benjamin de. See SOUBISE.

Rohan, Henri de, a French Protestant leader; born in Brittany, France, Aug. 25, (or 21), 1579. He is less remarkable for military achievements than for his four books of memoirs: the first three published under the title "Memoirs on Events in France from the Death of Henry the Great to June, 1629" (1644), covering the civil wars; and the fourth as "Memoirs and Letters on the War of the Valtelline" (1758), whither Richelieu had sent him to keep off the Imperialists and the Spanish. They rank among the finest of the memoirs written by the aristocracy of the 16th and 17th centuries. He also wrote "The Perfect Captain" (1636), a political tract; and others. He died April 13, 1638.

Rohan, Louis René Edouard, Prince de, Cardinal-Archbishop of Strassburg; born in 1734. He became coadjutor to his uncle in

the see of Strassburg, and afterward his successor; was sent in 1772 as ambassador to Vienna, where he displayed the most ridiculous luxury, but vainly sought to obtain the favor of the Empress Maria Theresa. As coadjutor he had ceremonially received the Princess Maria Antoinette on her entrance into France. On the death of Louis XV. he returned to Paris, and for 10 years bent all his energies and efforts to winning the favor of the queen, but all in vain. Nevertheless he had meanwhile become, in spite of his known profligacy, Archbishop, Grand-Almoner, Cardinal and Commendator of St. Wast of Aeras, one of the richest benefices in France. Associate of the quack Cagliostro, and of the infamous Madame Lamotte, he was duped by a forged letter with the signature of the queen, and induced to buy of Boehmer, the court jeweler, the now too celebrated diamond necklace, in the name of the queen. The necklace was placed in the hands of Madame Lamotte, forged autograph messages from the queen followed, and an interview in the park of Versailles between the cardinal and a fair adventuress personating the queen. On the discovery of the fraud, Rohan was summoned before the king, answered vaguely and unsatisfactorily, and was arrested and imprisoned in the Bastille, Aug. 15, 1785. After a year's proceedings he was acquitted and released, but at the same time exiled from the court, and deprived of his grand-almonership. He was deputy to the States-General in 1789; was afterward accused of various disloyal intrigues and maladministration; gave up his see in 1801, and died in 1803.

Rohilkhand, or Rohilcund, a division of British India, United Provinces; area, 10,885 square miles; pop. 5,479,688. The surface is a plain, with a gradual slope S., in which direction its principal streams, Ramganga, Deoha, and others, flow to the Ganges. It takes its name from the Rohillas, an Afghan tribe, who gained possession of it early in the 18th century. It is subdivided into the districts Bijnur, Muradabad, Budaon, Bareli, Terai, and Shahjahanpur. It incloses the native principality of Rampur.

Rohlf's (rölfs), Friedrich Gerhard, a German-African traveler; born in Vegesack, Germany, April 14, 1831; studied medicine, and in 1855-1860 served with the French in Algiers as surgeon in the foreign legion. In 1860 he traveled through Morocco dressed as a Mussulman, and explored the Tafilet Oasis in 1862. In 1863, and again in 1865, he traveled in North Africa, making his way on the latter occasion from Tripoli to Lake Tchad, Bornu, etc., and finally to Lagos on the W. coast. He joined the English Abyssinian expedition in 1867. In 1868 he traveled in Cyrenaica, and in 1873-1874 he conducted an expedition through the Libyan Desert. He traveled across North America

Rohlf's

in 1875-1876, and in 1878 he undertook a new journey to Africa and penetrated to the Kufra Oasis. In 1880 he visited Abyssinia. He was appointed German general-consul at Zanzibar in 1884, and returned to Germany in 1885. His works include, among others: "Journey through Morocco" (1869); "Land and People of Africa" (1870); "Across Africa" (1874-1875); "Journey from Tripoli to the Kufra Oasis" (1881); "My Mission to Abyssinia" (1883); "What News from Africa" (1887), etc. He died in Godenburg, Prussia, June 3, 1896.

Rohlf's, Mrs. See GREEN, ANNA KATHERINE.

Rokitansky, Karl, Baron von, founder of the school of pathological anatomy in Vienna; born in Königgrätz, Bohemia, Feb. 19, 1804; studied medicine at Prague and Vienna; in 1828 was appointed assistant to the Professor of Pathological Anatomy in the university of the latter city and in 1834 succeeded him. He likewise held the offices of prosecutor at the city infirmary, legal anatomist to the city, and medical adviser to the ministry of education and public worship. In 1869 he was made president of the Austrian Academy of Sciences. He retired from work in 1875, and died July 23, 1878. Although Rokitansky agreed with the old humoral pathologists in so far that he regarded the changes of the blood as the chief immediate causes of disease, he laid the principal stress of medical study upon morbid anatomy, post-mortem dissection, and observation. He stands preëminent among German medical teachers as the one who established pathological anatomy as the basis of all original scientific inquiry in the domain of medicine. His teachings were published in the great work "Handbook of Pathological Anatomy" and in "Memorials" of the Vienna Academy of Sciences.

Roland (Italian, Orlando; Spanish, Roland), the name of the most prominent hero in the Charlemagne legend. Unlike most legendary heroes, Roland is a figure in history as well as in poetry and fable, though it cannot be said that the place he occupies as a historical personage is an imposing one. All that we know of him is contained in one line of Eginhard's "Vita Karoli," chap. ix., and that simply records his name, Hruodlandus, his rank of prefect or warden of the march of Brittany, and his death at the hands of the Gascons in a valley of the Pyrenees. Such is the acorn from which a whole forest of romance has sprung up. According to the "Annals" (commonly attributed to Eginhard, but by some to Angilbert, who died 15 years before they end), Charlemagne was invited in 777 to take possession of Saragossa and other cities in Spain by Ibn al Arabi, leader of the revolt

Roland

against the Khalif Abd-er-Rahman, and in 778 crossed the Pyrenees into the territory of the Gascons, attacked and took Pamplona, the stronghold of the Navarrese, and advanced to Saragossa, and having received the submission of Ibn al Arabi and his friends, and taken hostages of them, returned the way he came. According to other accounts the Saracens played him false, and a rising of the Saxons compelled him to hasten home. Al Makkari merely says that after warring for some time with Abd-er-Rahman he sent him an embassy proposing an alliance and friendship, and that peace was concluded between them.

At any rate it is certain that Charles made but a short stay in Spain, that on his way back he levelled the walls of Pamplona to the ground, and that about 25 miles N. E. of it the rearguard of his army was annihilated by the Gascons. "Roscida Vallis," the common etymology of Roncesvalles, the scene of the disaster, is, of course, like all such etymologies, nonsense. In its oldest known form the name is Rencivals, and there can be no doubt that it is Basque. Whatever may be the true reading of the first syllable, the last two are clearly a corruption of *zabal* or *zaval*, a word which enters into the composition of perhaps 100 place-names in Navarre and the Basque provinces, always indicating a flat, level space, which exactly describes the battlefield. It is a small oval plain, evidently an old lake-bed, shut in all around, except on the S. where the waters escaped, by steep mountain ridges clothed from base to summit with thick beech woods. To the N. there is a slight depression where, by the Col of Ibañeta, a path crosses the crest of the Pyrenees and descends the Val Carlos to St. Jean-Pied-de-Port. The features of the spot and the facts of the catastrophe, no doubt, also, are faithfully given in a few words by Eginhard, who in his youth must have often heard them spoken of by Charlemagne's old soldiers.

As the army, by reason of the narrowness of the place, was marching in extended order, the Gascons, who, profiting by the denseness of the woods that abound there, had posted themselves in ambush on the heights, rushing on those guarding the rear, hurled them into the valley beneath, and there slew them to a man; and having seized the baggage, dispersed under cover of the night in all directions, so that there was no finding them to take vengeance on them. Roncesvalles is in fact a natural trap, and it says little for Charles as a general that he should have ventured into it without first securing the heights and scouring the woods; for when Roland, in the "Chanson," thinks of it, it is too late. He was in a hostile country, made so by his own acts. It may be—to put him in

the most favorable light—that he was compelled by military necessity to invade Navarre, that resistance forced him to take Pamplona, that levelling its walls, though it looks awkwardly like spite, was a precaution in view of a future campaign, and that, in short, he “simply used military license on the country.” But this, as Major Dalgetty observes, “excites no benevolence in those who sustain injury,” and the Basques of Navarre had good reason to resent their treatment at his hands.

They were not semi-savage mountaineers, as most French writers try to make them out, but a gallant little Christian State holding their own stoutly, after the fashion of Pelayo, against the common foe; and yet this pillar of the Church, this pious champion of Christianity, hot from the conversion of the Saxons, comes down upon them, for his own ends treats them as if they were Saracens, or worse, takes away from them their armor wherein they trusted, their walls, next to their mountains their best reliance, and leaves them naked to their enemies. Eginhard may talk of the perfidy of the Gascons, and poets sentimentalize over the *dolorosa rotta*, but history and justice will call it a merited retribution for overbearing militarism, and the proper punishment of insolent contempt for a weak adversary.

Naturally, the tragic character of the disaster, and the reverse to the mighty King of the Franks at the close of what was looked upon as a holy war, made a deep and wide-spread impression. On himself the effect, the “Annals” say, was that it clouded the success of his expedition, and there can be no doubt that already in his lifetime it was a theme with the popular minstrels far and wide. In the middle of the 9th century the biographer of Louis held it needless to mention the names of those who fell, *quia vulgata sunt*. In course of time the story underwent modifications in the hands of the poets. Everything in it was magnified. The expedition became a campaign lasting twice as many years as it had occupied months; the disaster was made a defeat of vast proportions, which, as a matter of course, was accounted for by treachery, the traitor Ganelon being invented for that purpose; the Basques were turned into Saracens; and for further dramatic effect Charlemagne, who was but 36, was represented as a venerable old man with a snow-white beard, and Roland as his nephew. And here it may be asked, how came Roland to be set up as hero? Eginhard mentions two others as having fallen, Anselm and Egghard, both of them persons of at least equal rank, and more immediately connected with the sovereign; but nothing more is heard of either.

The only explanation is that, if they were left unwept, unhonored, and unsung, it was because the jongleurs could not conveniently sing their names, while Rodland, Rotland, Rollanz, Roland lent itself to song as if made on purpose. “An old song” is held to mark the zero of importance, but it is one of the most potent of agencies. It lurks among the roots of history, dispensing immortality at will, and conferring renown irrespective of deeds or merits. Roland, for aught we know, was only an ordinary Breton country-gentleman, but old songs have made him the equal of Achilles, Hector, Alexander the Great, and Arthur of Britain. Of these old songs we know little or nothing beyond the fact of their existence. If the *barbara carmina* taken down by Charlemagne’s orders were of the same sort, they were probably the only ones of the kind ever committed to writing. Nor do we know much more of their relation to the earliest written lays. M. Léon Gautier, who has made the subject the study of his life, at first held that the *chansons de geste* were little more than the primitive songs strung together, but he now thinks that they were merely inspired by them, and borrowed only their legendary and traditional elements.

The truth probably lies between the two views. It is more likely that there is no hard and fast lines to be drawn between the songs and the *chansons de geste*, and that the latter were of very gradual growth. The jongleurs in singing the songs, cantilenæ, or ballads, as we should call them, relating to an event like the Roncesvalles disaster, would naturally from time to time introduce new ones for the sake of novelty or as connecting links, and thus a recognized sequence would be established, which, as minstrelsy became more and more of an art, the jongleurs more like trouvères, and their hearers more cultured and critical, would in course of time grow into a continuous lay. By some such process as this, in all probability, the “Chanson de Roland,” unquestionably the oldest and best of the *chansons de geste*, was produced.

The oldest form in which we have it is that of the MS. in the Bodleian Library, Oxford, written presumably toward the end of the 12th century; but this is evidently by no means its oldest form as a consecutive poem. M. Gautier, who loves precision, places its composition between the Norman Conquest and the first Crusade, but it is impossible to fix precisely the date at which it ceased to be a mere congeries of songs and became a *chanson de geste*; at any rate the two references to England as one of Charlemagne’s many conquests cannot be relied on. Nor do the allusions to Mont Saint-Michel justify the assertion that it is certainly the work of a Norman.

It is of course in the language of the N. half of France, the language of the *trouvères*, but there is no good reason for assigning it to any one province. An interesting reference to the country of the poem is spoiled by M. Gautier. The death of Roland, we are told, was presaged in France by storms and earthquakes "from Saint-Michel to Seinz, from Besançon to Wis-sant." It is not certain here what place is meant by Seinz. M. Francisque Michel suggests Sens; a 13th-century MS. reads Rains (Reims); M. Gautier boldly proposes the "saints of Cologne"—i. e., the relics preserved there.

Far more probably, as a glance at the map will show, the place intended is Saintes on the Charente, the old capital of the Santones and of Saintonge, a town that makes a considerable figure in the Middle Ages and in the Charlemagne legend. With the other three places mentioned it forms a quadrangle which exactly represents the region within which the *langue d'oïl* was dominant. S. of the line from Saintes to Besançon was the country of the *langue d'oc*, the Provençal; W. of the line from Mont Saint-Michel to Saintes was the Breton; E. of the line from Besançon to Wis-sant, near Calais, the language was Teu-tonic. The old minstrel was not thinking of a Rhine frontier, as M. Gautier imagines, but of the habitat of his hearers, the country where his words would be understood. The best, and most likely the oldest, part of the poem is that which deals with the combat at Roncesvalles, Roland's refusal, till too late, to sound his horn, the deeds and deaths of the peers one by one, and of Roland last of all. The opening portion, the dispatch of Ganelon at Roland's sugges-tion as envoy to the Saracens, his anger and betrayal of Roland in revenge, and the con-cluding part, the vengeance of Charlemagne, and the trial and death of Ganelon, prob-ably came later. There can be little doubt that the episode of the Emir Baligant was a comparatively late addition.

Besides the Oxford MS. there are half a dozen others ranging from the 13th to the 16th century. The differences between the earlier and later are significant. In the Oxford MS., which is one of the little pocket copies carried by the jongleurs, the as-sonant rhyme (that which disregards the consonants and depends on the accented vowel) is maintained throughout, the same assonance being kept up to the end of each break or paragraph. In the later MSS. the assonant is turned into the full consonant rhyme, and the poem expanded to twice or thrice its former length. The first shape is the poem as sung; the second as adapted for readers when the minstrel was no longer the sole vehicle, for poetry and reading was becoming a common accomplishment. A very close German version, the "Ruolandes

Liet," shows that early in the 12th century the chanson had passed out of its native country and language; and it is almost as closely followed in the Icelandic "Karla-magnus Saga" of the 13th. The "Chanson de Roland" is the foundation of the Char-lemagne legend. Charles's wars and quarrels with his vassals would no doubt of them-selves have furnished themes for the jong-leurs, but the legend, culminating in the Morgante of Pulci and the Orlandos of Boiardo and Ariosto, is the outcome of the story of Roland and Roncesvalles.

Roland, Manon Jeanne Philippon, Madame, wife of Jean Marie, and her-self the spirit of the Girondin party; the



MADAME ROLAND.

daughter of a Paris engraver; born in that city, March 17, 1754. She was the only child of nine, left to the care of her father, who provided her with masters regardless of expense and gave her a brilliant educa-tion; the best grounds for which existed in her native talents, her firm spirit, her per-sonal beauty, and her undoubted virtues. Antiquities, heraldry, philosophy, and, among other books, the Bible, made up her earliest studies; her favorite authors, how-ever, were Plutarch, Tacitus, Montaigne, and Rousseau. She became the wife of Ro-land in 1779, and as her love for him was founded on his antique virtues and his phil-osophic spirit, she has been called "The Heloise of the 18th century." She became the sharer in all his studies, aided him in editing his works, and during his two min-istries acted as his secretary and entered into all the intrigues of his party without debasing herself by their meanness. She was the angel of the cause she espoused, the soul of honor and the conscience of all who embraced it; while her boldness, her political sagacity, and her sarcastic elo-

Roland de la Platiere

quence were equally dreaded by their adversaries. After the flight of her husband, Madame Roland was arrested by order of the Paris Commune under the dictation of Marat and Robespierre, and consigned to the Abbaye prison, from which, on Oct. 31, she was removed to a more wretched abode in the Conciergerie. When sentenced at the bar of Fouquier Tinville she was eager to embrace her fate, and rode to the guillotine clad in white, her glossy black hair hanging down to her girdle. She declared her conviction that her husband would not survive her. On the scaffold this noblest victim of the cause in which she suffered apostrophized the statue of liberty, and bowing her head before it exclaimed, "Ah Liberty! what crimes are committed in thy name!" Besides her miscellaneous works, Madame Roland left "Memoirs" composed during her captivity, and a last affecting composition in the "Counsels of a Letter," addressed to her little girl; the former, it is suspected, have been since tampered with. She was executed Nov. 8, 1793.

Roland de la Platiere, Jean Marie, a French statesman; born in Villefranche, France, Feb. 18, 1734; was inspector-general of manufactures and commerce in that city when the French Revolution commenced, and having embraced popular principles became, in 1790, member of the Lyons municipality. In February, 1791, he was sent to Paris as deputy extraordinary to defend the commercial interests of Lyons in the committees of the Constituent Assembly, and remained there seven months, accompanied by his noble hearted wife. This period dates from the contemplated flight of the king, just before the death of Mirabeau, to the dispersion of the assembly after the acceptance of the new constitution, and it made the Rolands acquainted with the rising popularity of Robespierre and the Girondins, who were not yet divided into distinct parties. They now returned home to La Platière for a short period, but in December returned to Paris; the office of inspector having been abolished, Roland had to claim a retiring pension; but he was also invited back by the patriots to take a part in the movement, for at this juncture the invasion of the emigrants was impending, and the veto of the king had brought the Parliament to a standstill. The practical philosophy, commercial knowledge, and strict simplicity of Roland, recommended him to men of all parties, and when the patriot ministry was formed in March, 1792, he was made minister of the interior. He kept his position till June 13, when the royal veto on the proposal to form a patriot camp around Paris, and on the decree against the priests, provoked his celebrated letter to the king, written, however, by Madame Roland, and,

Rollenhagen

as a consequence, his almost instant dismissal. This event was followed by the arrival of the Marseillais in Paris, and the conflict at the Tuileries, on Aug. 10, when Roland was recalled, and Danton became minister of justice. The struggle between the Girondists and the municipality under the guidance of Robespierre filled up the period till May 31; the former party were then vanquished, and Roland was among the number who saved their lives by flight. He found an asylum with his friends at Rouen, but deliberately killed himself with his cane sword on hearing of the execution of his wife, Nov. 15, 1793. His body was found by the roadside, and a paper in his pocket contained his last words, among which were these: "Whoever thou art that findest these remains, respect them, as those of a man who consecrated the life to usefulness, and who dies as he has lived, virtuous and honest. . . . On hearing of my wife's death I would not remain another day on this earth so stained with crimes."

Rolfe, William James, an American editor; born in Newburyport, Mass., Dec. 10, 1827. He was a distinguished Shakespearean scholar, and published many editions of Shakespeare, annotated; among them "The Friendly Edition," in 20 volumes, (1870-1883), and a "School Edition," in 40 volumes. He also published: "Shakespeare, the Boy"; annotated editions of selections from Tennyson, Scott, Browning, Wordsworth, Gray, Goldsmith and other English poets; and "Tales from English History." He died July 7, 1910.



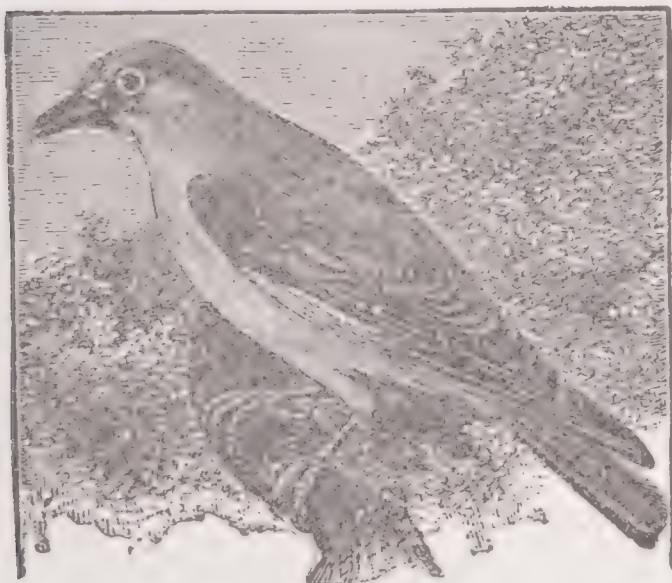
GEORG ROLLENHAGEN.

Rollenhagen, Georg, a German poet; born in Bernau, Germany, April 22, 1542. His great work is the remarkable heroic-

Roller

comic and didactic poem entitled "Froschmeuseler, the Grand Court of the Frogs and Mice" (1595); where, under the guise of frogs, rats, mice, cats and foxes, the author describes the people of his day—their customs, domestic life, temporal and spiritual government, and lastly their military state. He also wrote "The Limping Courier," and other works. He died in Magdeburg, May 20, 1609.

Roller (*Coraciidæ*), a family of Picarian birds characteristic of the Ethiopian and Oriental regions, though the common roller is extensively distributed in the Palæarctic region and a few species enter the Australian region. None are found in the New World. Madagascar possesses three species peculiar to itself, and so different from one another that they are regarded as types of different genera, and so different from other rollers that they are grouped into a separate sub-family *Brachypteracianæ*; they are named ground rollers, and are



THE COMMON ROLLER.

nocturnal in habit. An Indian species, *Eurystomus orientalis*, is also nocturnal. The common roller (*Coracias garrula*) is an autumn or more rarely a spring visitor to the British Isles; and about 100 have been recorded since the first one was noticed by Sir Thomas Browne in 1644. Some have visited the Orkneys and Shetlands, one has been found as far W. as St. Kilda, and about half a dozen have been recorded from Ireland. It is a straggler to Northern Europe; in Central Europe it is common; in countries bordering on the Mediterranean it is very abundant. It ranges through Asia to Omsk in Siberia and to Northwest India. In winter it extends its migrations to Natal and Cape Colony. In size it is about a foot long. The general color is light bluish green; the mantle is chestnut-brown; the wings and rump are adorned with beautiful azure blue. The female resembles the male in plumage. Nesting takes place in the woody haunts in May.

Roller Skate

The nest, which is made in a hollow tree or wall, is built of a few chips, or of roots, grass, feathers, and hair, according to circumstances. The eggs are five or six in number and are of a glossy white color. The food consists of beetles and other insects captured on the ground. The name "roller" is given to the bird on account of its varied and unsteady flight and the habit the male has, during the breeding season, of indulging in extraordinary tumbling antics, and turning somersaults in the air.

Roller Boat, a boat propelled by wheels which roll over and on the water instead of cutting through it. This craft was built by Ernest Bazin, a Frenchman, in 1896. In August of that year it was launched on the Seine river. The wheels are 39 feet in diameter and sink one-third of this measurement in the water. They are much like two saucers cemented together at their edges, and are hollow. There are three on a side, 15 feet apart across the beam and about 12 feet apart fore and aft. The deck, really a platform in construction, is mounted above the center of the wheels and has apertures through which the tops of the wheels penetrate. The main engines are of 550-horse power. A small engine rotates each pair of wheels. The boat has attained a speed of 12 knots an hour. Its chief interest is in novelty of construction.

Roller Skate. The earliest roller skate was patented by a Frenchman in 1819. Since that time scarcely a year has passed without the recording of some improvement in wheel skates. Plimpton's improvement consisted in so gearing two pairs of wheels that they would "cramp" when the footplate was canted to either side, and thus cause the skate to move on a curved line. Several years elapsed before the value of the invention was generally recognized; but in the meantime the inventor was busy making improvements and taking out other patents and in 1874 had brought the skate practically to its present condition. This device of "cramping" the wheels secured the initial success of roller skating. The earlier inventions were crude affairs compared with the modern appliances; the present roller skate combines strength, lightness, and ease of action in a marked degree. About 1864 the mania for rolling skating first appeared in England; but in 1866 the "rinking" fever broke out in Australia, and spread thence to England and the United States. Since that time the craze has appeared at intervals only to again die out. The most recent of these arose in 1884-1885 in the United States, but soon shared the fate of its predecessors. The most recent form has only two wheels, set one behind the

other, and resembling the ice skate in its form and action.

Rollett, Hermann, an Austrian poet; born near Vienna, Germany, Aug. 20, 1819. He published two collections of "Wreaths of Song" (1842); "Wanderings of a Vienna Poet" (1846); "A Sister" (1847); "War Songs" (1848); "Oratorical Poems" (1871); "Narrative Poems" (1872); and others. An American edition of his writings has appeared as "Poems from the German of Hermann Rollett" (1887).

Rollin, Ambrose Lucien (rō-lang'), a West-Indian historian; born in Trois Rivières, Guadeloupe, in 1692. He devoted his leisure to researches upon the Caribs and other Indian tribes, and published several works which are still considered authorities upon the subjects he covered. They include: "History of the Indians" (1739); "The Indians and the Spanish Conquest" (1840); "History and Description of the Caribs, their Condition after the Conquest" (1843); "Civilization of the Indians Compared to their Social Condition" (1845); and "The Incas of Peru and the Spanish Conquest" (1748). He died at Pointe à Pitre in 1749.

Rollin, Charles, a French historian; born in Paris, Jan. 30, 1661. His best-known work is the "Ancient History" (1730-1738), often reprinted in France, England, and the United States, and not useless even yet as an entertaining popular work to create an interest in history. He wrote in an uncritical age, but he was a good story teller and a keen judge of a good story. His other works include "Roman History" (1738-1748), and a "Treatise on Study" (1726-1731). He died in Paris, Sept. 14, 1741.

Rollinat, André, a French historian; born in Bordeaux, France, in 1741. He devoted himself to researches on the early navigators who have been credited with the discovery of America, and published "Researches on the Forerunners of Christopher Columbus in America" (1785); "The Norwegian Sagas and the Scandinavian Navigators" (1788); "Table of the Tithes Paid to the Treasury of St. Peter during the 13th and 14th Centuries by Vinland" (1790); "History of the Norse Navigators" (1791); and "Researches on the Discovery of Brazil by a Dieppe Navigator of the Fifteenth Century" (1791). He died in Nantes in 1793.

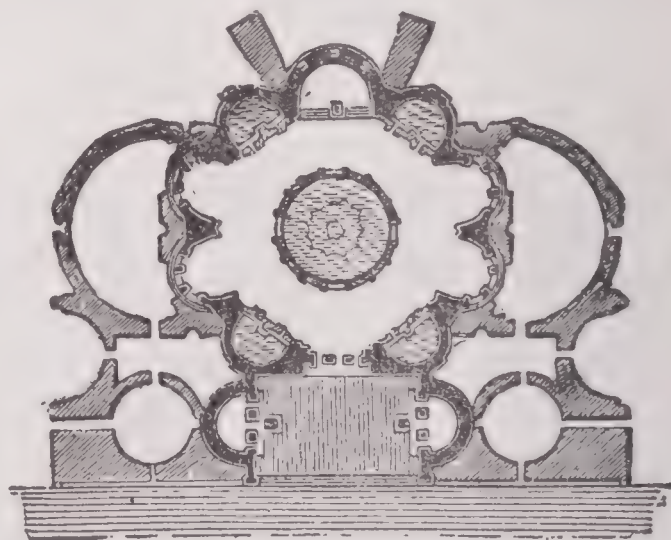
Rolling Mill, a combination of machinery used in the manufacture of malleable iron and other metals of the same nature. By it the iron which is heated and balled in the puddling furnace is made into bars or sheets. It consists of rollers, journaled

in pairs in metallic boxes in the iron standards or cheeks, and capable of being set toward or from each other by means of set-screws. The grooves in the rolls are so made as to be coactive in giving the required form to the heated iron passing between them. The face of each roller has a series of grooves gradually decreasing in size toward one end. The iron is passed through each in succession, being thus gradually reduced in size and increased in length. By this operation two objects are effected: (1) The scoriæ and other impurities are expelled, and (2) the required form whether of plate, bolt, or bar, is given to the metal.

Rollins, Alice Marland (Wellington), an American verse writer; born in Boston, June 12, 1847. She wrote "My Welcome Beyond and Other Poems" (1885); "All Sorts of Children" (1886); "The Three Tetons" (1887); "Uncle Tom's Tenement" (1888); and "From Palm to Glacier." She died in Boston, Dec. 5, 1897.

Rollins College, a coeducational non-sectarian institution, in Winter Park, Fla.; opened in 1885; has endowment of over \$225,000; grounds and buildings valued at over \$120,000; scientific apparatus, etc., \$26,000; volumes in the library, 8,000; ordinary income, \$50,000; average number of faculty, 20; average student attendance, 200.

Roman Architecture. It can hardly be said that the early Romans had any style of architecture of their own, since they borrowed their ideas of building first from the Etruscans and afterward from the Greeks.



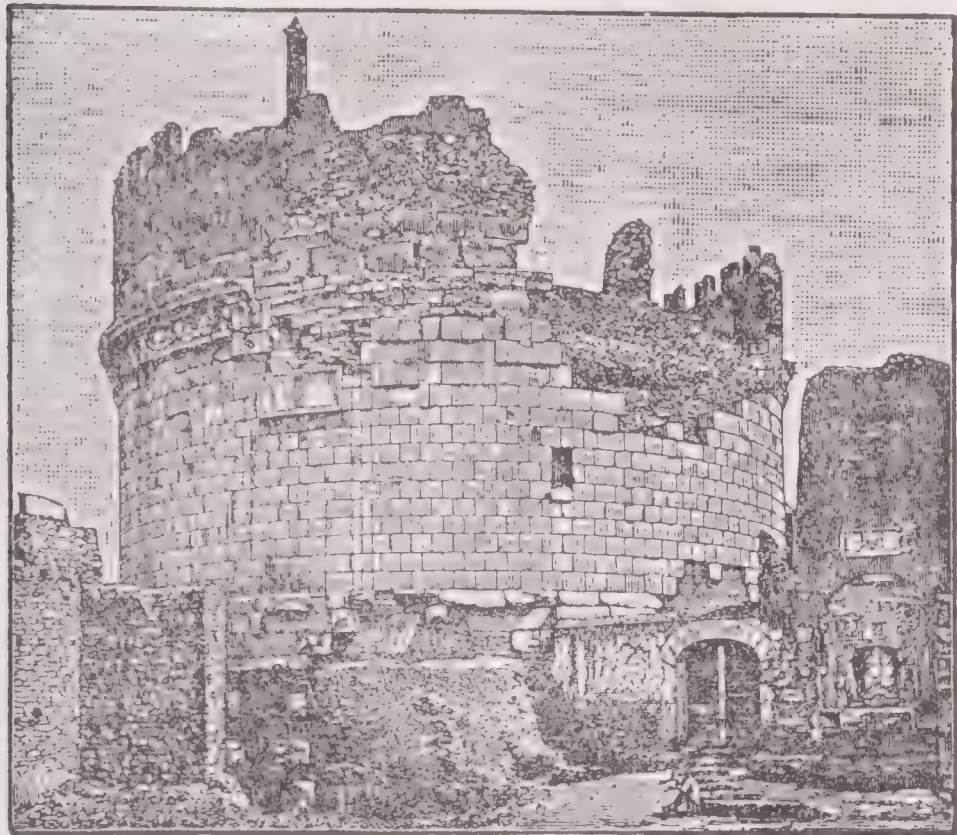
PLAN OF TEMPLE OF MINERVA MEDICA
AT ROME.

In the time of Romulus their dwellings were of the rudest description, being chiefly composed of straw; and at a later period their temples were only small square buildings, scarcely large enough to contain the statues of their deities. The first king who constructed works of a large class requir-

ing architectural skill was Ancus Martius. His first attempt was the building of the city and port of Ostia, at the mouth of the

and especially from Greece, to beautify the city. It was said of Augustus "that he found Rome built of brick and left it of marble." Under Vespasian and the Antonines architecture flourished, as the remains of the Coliseum and the temples of Antoninus and Faustina testify. After this period, however, architecture declined till Constantine transferred the seat of government to Byzantium, when a new style was introduced.

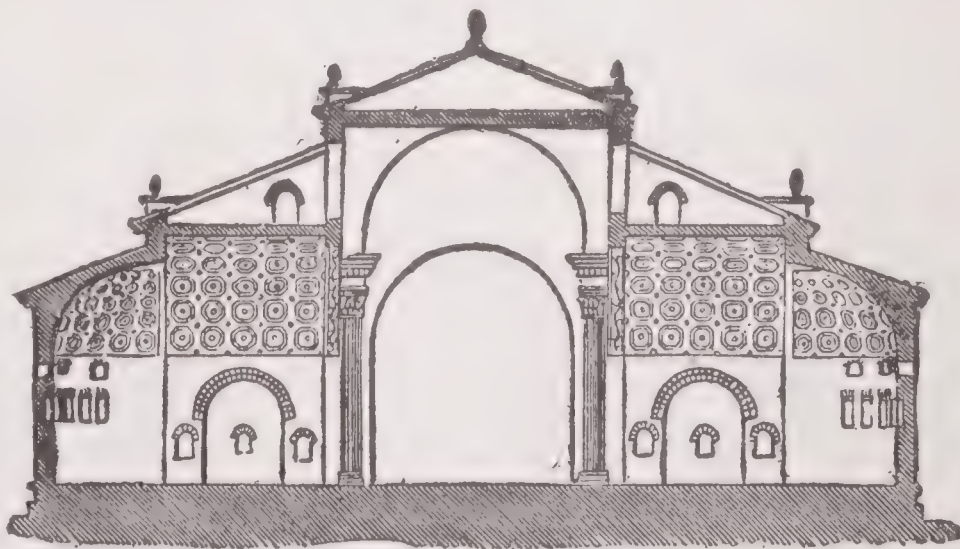
In comparing Greek and Roman architecture there can be no doubt that the former greatly excels in the matter of taste. Among the Greeks, moreover, religion was almost the sole purpose for which architecture seemed to exist; while, among the Romans, their temples were neither so extensive nor so numerous as their buildings of public utility or convenience. Besides a large number of engineering works, there are still the remains in Rome of fora, baths,



TOMB OF CÆCILIA METELLA.

Tiber. During the time of Tarquin the Elder the city was much improved by the skill and enterprise of the Etruscans, the great circus was built, and the walls of the city constructed of large hewn stones. The great Cloaca, or public sewer, was also commenced, together with the temple of Jupiter Capitolinus. The decoration and improvement of the city was greatly increased during the reign of Tarquinius Superbus; but the Capitol was not finished till after the expulsion of the kings. During the first two Punic wars many temples were erected; but they do not appear to have been of great magnificence. Altogether very little taste had been shown in the Roman buildings till their conquests extended and they became intimate with the more costly buildings of their enemies. Metellus Macedonicus, the contemporary of Mummius, the victor of Corinth, was the first who built a temple of marble at Rome; but from that time most of the larger edifices were built of that material. Grecian art and architects were also introduced about the same period. Under Julius Cæsar, many new and magnificent buildings were erected; and during the Golden Age, under Augustus, most of the finest edifices were built; architects flocked from all quarters,

palaces, circi, theaters, amphitheaters, libraries, halls of justice, triumphal arches, commemorative columns, mausolea, and similar buildings. The requirements of such edifices as these naturally led to the practice of composition and grouping, as one uniform plan of building would not have been suitable for such a variety of purposes. Another cause of variety lay in the employment of the arch, which allowed much greater latitude in compositions than the entablature of the Greeks. The semi-circular form of the arch next led to quite a new

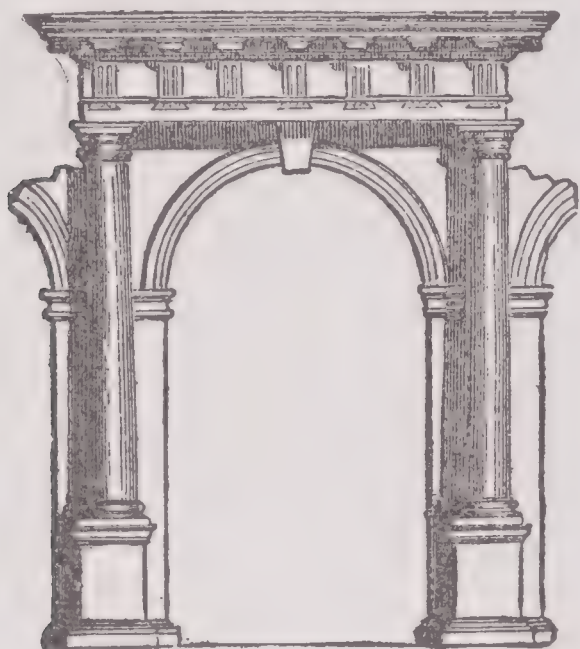


TRANSVERSE SECTION OF BASILICA OF MAXENTIUS.

feature in architectural design—namely, the dome—a feature which gave a totally distinct character to buildings in which it was

Roman Candle

employed. The Pantheon is the most remarkable example of this arrangement. The circular plan of building became also a favorite one for tombs and mausolea. Among the most noted of these was the mausoleum of Hadrian, remains of which now form the well-known castle of St. Angelo; and the tomb of Cæcilia Metella. A



DORIC ARCADE.

characteristic feature in Roman architecture, and one that entered largely in the system, is the employment of order above order in the same building. While this arrangement is faulty, for it is incompatible with the requirements of the highest standard of taste, yet still, at the same time, it proves the Roman aptness of invention and versatility of design. The style of architecture called the Roman order was invented by the Romans from the Ionic and Corinthian orders; and hence it is sometimes called the Composite order.

Roman Candle, a species of firework consisting of a tube partially filled with alternating perforated stars and small charges of gunpowder. Fire communicated to the upper end ignites the charges successively, which throw out the stars till all are discharged.

Roman Catholic Church, that section of the Christian community which is ruled by the Bishop of Rome, and which maintains as a religious doctrine the supremacy of the Bishop of Rome over all other bishops, and his headship of the Church established by Christ. This doctrine not only differentiates the Roman Catholic communion from all others, but it also provides the key to its constitution, its history, and many of its doctrines, customs, and traditions. The Roman Catholic theologians contend that Christ conferred upon St. Peter the headship of the Church when He said to him: "Thou art Peter, and upon this rock I will build my church, and the gates of hell shall

not prevail against it" (Matt. xvi. 18); second, that St. Peter fixed his see in Rome, and transmitted his powers to his successor; third, that Pope after Pope exercised universal sovereignty over the Church; and finally, that the rejection of this supreme authority by the Christians of the Orient and elsewhere places them outside the pale of the true fold, and makes them schismatics or heretics. From this standpoint the history of the Roman Catholic Church in all its departments has been written. By keeping this fact in mind the student will find it not difficult to grasp a subject otherwise complex and confusing through its extent and variety.

Constitution and Government.—The constitution of the Church is claimed as of divine origin. It is consequently incapable of change as to the substance, and must present in every age and in every nation the same characteristics. The central idea of Roman Catholic theologians is "one fold and one shepherd." They define the Church itself in the popular catechism as the entire body of the faithful who profess the same faith and partake of the same sacraments under one leader, Christ. The Church is infallible, that is, it can never teach error either by accident or design; it is indefectible, which means that it can never die, and must always touch human activity and history at some point; and it possesses divine authority, which to disobey makes the recalcitrant an enemy of God. These three qualities of infallibility, indefectibility, and authority have their living exponent and representative in the Pope. He is the source of jurisdiction, the universal legislator, the supreme authority, the bishop of bishops, the father of the faithful; and, therefore, officially he is, like the Church, infallible, indefectible, possessing the delegated authority of Christ.

As he is the successor of St. Peter, the other bishops are looked upon as the successors of the other apostles. They are independent of one another, but all are united in their common dependence upon the Pope, who is the bishop of bishops. From him they receive jurisdiction over their particular dioceses, and without his permission and concurrence, expressed in legal forms and documents, they cannot receive consecration to the episcopate or exercise authority anywhere. The episcopate is the fullest expression of the priesthood and its powers. The Pope as the bishop of Rome is no higher essentially than any other bishop. But he has jurisdiction over the universal Church, while the bishops exercise jurisdiction over only a part of the Church, and in obedience to him. Next to the episcopate is the order of the priesthood, the powers of which are more limited. The priest is in theory the assistant of the bishop, who

makes him a priest by conferring the sacrament of Holy Orders upon him, and gives him the right of exercising his ministry in a given territory; that is, within the limits of the diocese to which he belongs, to baptize, to say mass, to absolve sinners, to perform the ceremony of marriage, and to serve the sick and dying. The power of confirming, and of ordaining to the ministry does not belong to the priesthood, being reserved entirely to the episcopate. The approach to the priesthood is through several degrees of Orders, beginning with Tonsure, in which the candidate has the hair on the crown of the head clipped, and is allowed to put on the cassock and surplice, as a sign of his admission into the ranks of the clerics. Then come the Minor Orders, the Subdiaconate, and the Diaconate. The candidate is free to return to civil life up to the reception of the office of subdeacon. Once that order is conferred he cannot withdraw, and is bound to the clerical and the celibate life forever. The greatest care is exercised in the selection and training of candidates for the priesthood. After a college course of six years in approved institutions the young men are placed in a seminary devoted solely to this work, where they spend from four to six years in seclusion from the world, not only studying the sacred sciences, but learning the essentials of the spiritual life. The various degrees of Orders are conferred at regular intervals, according to the progress and character of the candidate; they may be deferred as a punishment or a warning; and the candidate may be dismissed as unfitted for the priesthood. *Once a priest, always a priest* is the theory of the ecclesiastical law. In practice it is absolutely impossible for a priest to secure dispensation from his priesthood and to take up civil life. If it be difficult to get out, it is nearly as difficult to enter the priesthood, so long and severe is the training, so watchful are the instructors and authorities. From the priests the bishops are chosen, and around the process of their elevation and consecration great safeguards are thrown to keep out the unfit. The officials of a diocese select the names of three eminent priests, and send them to Rome. The Pope names the bishop from the list, and notifies him of the election, but until he receives the official document naming him to the vacant see, the bishop-elect is not permitted to exercise any authority. He is consecrated by three bishops of the country with great ceremony and the widest publicity, so as to guard against all possible dangers from fraud or imposture either then or later. Holy Orders is regarded by Roman Catholic theologians as a sacrament founded by Christ; it can be conferred only by a bishop; once conferred its powers can be exercised only within well-defined limits; and the

faithful in general are bound to obedience and respect towards their sacerdotal rulers. The Church is therefore divided into two bodies, the ruling hierarchy and the laity, the teachers and the taught. The laity is without direct power, having no official place in the government, as in other denominations.

The seat of church government is in Rome, where various departments have been formed to administer the affairs of the whole body, precisely as in the case of secular governments. The Pope, assisted by his secretary of state and a trained body of diplomats, known as nuncios, auditors, secretaries, delegates, and ablegates, looks after the general conduct of affairs and the relations with particular governments; the congregation or society of propaganda manages the business of missionary countries, such as the Orient, or of more important districts in which the canon-law does not prevail, as the United States; the congregation of bishops and regulars handles questions concerning the episcopate and the religious communities; the congregation of rites deals with questions of rites and rubrics; and the congregation of the index examines the character of such books as are submitted to it under suspicion of error. The college of cardinals, of which the general public hears more than of any other official body, has only one duty,—to elect a Pope after a vacancy; but its members residing in Rome usually have a share in the government as members of the congregations. Such are in brief the principles and the method of ecclesiastical government in the Roman Catholic Church: a hierarchy, divinely instituted, of which the Pope is the infallible, indefectible, and authoritative head; a priesthood sharing some of the powers of the episcopate, but not its jurisdiction; and a government suited to these principles and the needs of the time.

Doctrines.—The doctrines held by the Church are not very numerous, at least such of them as have been precisely defined and presented to the believer. The defined doctrines are commonly known as dogmas, and must be accepted by the true Catholic, unless he is ready to forfeit his membership in the Church. An account of them is interesting at this moment, when dogma is being gradually abandoned by many Christian sects as incompatible with the progress of religion. The Roman Catholic theologians boast that doctrine with their communion never changes, only develops by a proper evolution. The existence of God in three Divine Persons is the fundamental dogma; the second divine person, the son of God, become man in the person of Jesus Christ, is the next in importance. The Church teaches that Jesus Christ was born of the Virgin Mary, by the power of the

Holy Ghost, third person of the Trinity, not by the ordinary act of human generation; that He possesses two natures, the human and the divine, expressed in one person, also divine; that He founded the Church, and only that one church, before His death on Calvary; that He rose again from death the third day; and that He ascended into heaven from Mount Olivet forty days later in the sight of His disciples. These facts are also dogmatic, that is, defined truths. The Church has accepted the theory of the fall of man from a state of original innocence and perfection, in which he was first created. His fall was brought about by sin, whose effect is seen in the cloudiness of human understanding and in the weakness of human will. To restore mankind to the innocence, if not the perfection, of Adam, there was necessary a new force in the world, but not of it, transcending nature; Christ provided that new force, which is called by the theologians Grace, a favor, a free gift. He founded the Church for the purpose of transmitting to each age and to all peoples the knowledge of Himself and the free use of Grace. The main channels by which Grace was to be provided for all men are called the Sacraments, of which there are seven, all divinely instituted by Christ Himself. The Church cannot institute a sacrament, which is defined in the popular catechism as "an outward sign of inward grace, instituted by Christ." These channels of Grace are known as Baptism, Confirmation, Penance, Holy Eucharist, Extreme Unction, Holy Orders, and Matrimony. The first is the essential sacrament for every member of the Church: "Unless a man be born again of water and the Holy Ghost, he cannot enter into the kingdom of God" (John iii. 5). Until a man has received this sacrament he can receive none of the others, and cannot be looked upon as a Christian; and in practice, for example, should it be discovered that a priest was not really baptized in his infancy, he must be baptized, confirmed, and ordained over again. Confirmation is conferred usually on children about the age of twelve. Penance is the absolution of sins after confession, and is conferred by the priest upon all over the age of seven years. The Eucharist, in the catechism, is defined as the sacrament which contains the body and blood, soul and divinity of Christ under the appearance of bread and wine. The Church teaches the Real Presence of Christ in this sacrament. The change of the bread and the wine into the person of Christ is accomplished in the rite or ceremony of the Mass, the great central rite of the Roman Catholic Church, around which all others group themselves. The doctrine has been thoroughly discussed for centuries under the familiar name of Transubstantiation. Ex-

treme Unction is the sacrament of the sick, and is conferred only when a person is dangerously ill, with the twofold purpose of helping his recovery, or strengthening him for death and judgment. Holy Orders is conferred only upon candidates for the priesthood. Matrimony is the sacrament of marriage, which with Catholics is indissoluble.

The immortality of the human soul is another dogma. The soul at death leaves the body and passes to instant judgment. According to this judgment it may enter heaven at once, and begin a blissful eternity in the very presence of God; or it may be sent to Purgatory, a middle state, where unexpiated sins are atoned for, after which it returns to heaven; or it may be condemned to hell, out of which it can never be redeemed. When the history or career of the human race has ended, the souls of men will be united to their bodies, and all will stand before God for a general and final judgment, in which His providence will be justified to all; and then the elect will return to heaven and the lost to hell. A middle state, permanent and happy, is also recognized, in which the innocent and good, who missed heaven through lack of baptism, will be placed. This is the entire teaching of the Church on the nature and destiny of man, and must be received by all the members without question under penalty of being cut off from the Church.

History.—The history of the Roman Catholic Church is one that involves much dispute as to its beginning. From the point of view of its own historians its history begins with the founding of the Church by Christ and the committing of the executive authority to St. Peter. This chief of the Apostolic body fixed his seat in the city of Rome and perished by martyrdom in the reign of Nero, about the year 67. He was succeeded by Pope Linus, and thus in an unbroken series of pontiffs the powers of St. Peter have been handed on from generation to generation to our own day, when Pius X. occupies the chair of St. Peter, which is popularly known as the Throne of the Fisherman in deference to the Apostle's trade. To these Roman pontiffs the Christian world of the first fifteen centuries paid due respect and obedience as the executives of the Church. Whoever refused that obedience in the essential matters of doctrine and discipline was cut off as schismatical or heretical. The schismatics and heretics were numerous at all times, but on favorable occasions they became formidable and seriously affected the whole Christian world. Whatever their success locally, in the course of time they came into direct conflict with the Pope, and were forced either to surrender their peculiar tenets or to set up as a sect, that is, cut off from union with the

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Church. The Papacy is the point of view for the Roman Catholic historian, who divides the history of the Church into three periods, and describes the events, personages, and movements of each with strict relation to the Roman See.

After the ascension of Christ, the Twelve Apostles, with Peter at their head, ruled the Church during the period called the Apostolic Age, which ended with the death of St. John the Evangelist in the year 110 or thereabouts. The teaching of the Apostles had by this time become almost coextensive with the Roman Empire, it had been received by the poorer classes with immense favor, and speedily began to engage the attention of the learned and the wealthy. Its expansion brought it to the notice of the government, whose officers discovered in the Christian body something quite different from the average religious sect which Rome complacently tolerated. The Christian teaching rejected the gods of the Empire, and refused them respect and worship. Neither persuasion nor punishment could change the character of the new religion, and for over two centuries the Empire carried on with the Church a struggle which resulted in the periods of bloody persecution familiarly known as the Ten Persecutions. The accession of Constantine the Great to the imperial throne in the year 312 put an end to persecution, and his toleration of the Christian faith later gave the new religion a sure standing in the Empire. It was permitted to develop freely in the light of day. Its constitution took shape and its ritual became familiar and precise. Its doctrines received from the great writers of the time dogmatic expression, and were lopped of all superfluities by the fierce criticism of opposing heretics, or by the exact decrees of councils. Free to live according to their own fashion, the Christians founded the monastic life in its chief forms, from the solitude of Anthony to the common life of St. Benedict. Paganism was fought on equal terms, and was finally defeated in spite of its recrudescence under the Emperor Julian. The first period of the history of the Church ends with the second Council of Trullo in the year 692.

Meanwhile, the Roman Empire had crumbled and the Church had come into contact with the German and Slavonic nations of the north. In the period of anarchy which fell upon Italy her bishops and missionaries were the only refuge and support of civil society. By degrees the northern barbarians were converted to Christianity. Pepin of France made the Pope a temporal ruler by conferring upon him the domain of Rome, and other princes gave their support to the missionaries of the Christian faith. Paganism was overcome, and along with it that part of Arianism which had escaped de-

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struction in the first period. The triumph of the faith was made complete when Charlemagne built up his empire, gave his aid to the work of the Church, and accepted from the Pope the crown of the Holy Roman Empire, the successor of that pagan empire which had perished miserably four centuries previous. From the date of Charlemagne's death, 814, the Church grew in power, and worked in harmony with the State. The Pope as the head of the Church became the arbiter of the nations, the superior of kings. Although the Greeks had fought this growing power for centuries, and finally withdrew from communion with Rome in 1054, the separation had no ill effect upon the course of the Roman organization. The zenith of its power was reached under Gregory VII., who was able, in the dispute with Henry IV. of Germany, to break the power and the pride of that monarch to excommunicate him, and to force him to sue for terms. Pope Gregory died in exile in 1073, but the Church continued at the height of power for some centuries longer, through the entire period of the Middle Ages.

Europe was now a well-defined entity, and began to develop its modern characteristics. The order of chivalry was founded, whose basic idea was the defense of the weak by the strong, expressed popularly in the devotion of the warrior knight to the lady of his love. Islamism had taken possession of the East, and the Popes roused European chivalry to its destruction by the Crusades. The plea of the Crusades was the rescue of the Holy Land from the power of Islam, but the actual achievement was the defeat of the Mahometan scheme to invade and capture Europe. The monastic orders increased in power and gave birth to the scholastic system of study and the mysticism which marked the learning, literature and art of the time. The great cathedrals of Gothic form were built, and mediæval art produced its masterpieces. The Popes were regarded as the vicars of Christ on earth, and held their wide influence for two centuries after the death of Gregory VII. Philip the Fair of France, able, sensual, and unscrupulous, humiliated and angered by the interference of the Pope with his divorce of one queen and marriage to another, revolted against Pope Boniface VIII., and delivered the blow which led to the decline of the papal power, 1303. From this date the temporal and spiritual influence of the Pope and of Christian faith began steadily to decline. Paganism began to revive in art and letters first, and later in social life and in politics. The Church finally fell into the great dispute over rival pontiffs, reigning at the same time, and all claiming the sovereign power, which began in 1378 and was not ended until 1417.

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Famous men and many councils worked hard to revive the failing powers and influence of the Church, but could not restore the old prestige. The climax of weakness and calamity arrived in 1529 with the revolt of the Augustinian monk of Wittenberg, Martin Luther.

The Lutheran revolt surpassed in extent and in radicalism all of its predecessors combined. Besides cutting off all northern Europe from the Church, dividing Germany, and embroiling France in civil wars, it maintained the thesis that the Roman Catholic Church was not the Church founded by Christ, but a monstrous superstition grafted upon true Christianity. The Lutherans rejected the primacy of the Pope, the majority of the sacraments, the power of the priesthood, the authority of the hierarchy, monasticism and mysticism, celibacy, tradition, the authority of the councils,—in fine, the entire Roman Catholic system. The Council of Trent endeavored to renew the spirit of the Catholic body, and to restore discipline. The treaty of Westphalia gave to the Lutherans political recognition and standing in 1648, and finally toleration in the Empire itself. The Church busied itself with stemming the Lutheran tide in the Latin countries, in which it succeeded, and enjoyed peace for a time; but the French Revolution almost annihilated it in France, and the principles of radicalism so spread elsewhere that finally the Pope was deprived of his temporal power in 1870, and the last vestige of his mediæval greatness was taken from him. This last calamity ended the third period of the history of the Church.

In the last thirty years, however, the Church has shown marked signs of revivification. In the Latin countries under the constitutional governments it has held its own and established better relations with the governments. In Germany it forced Bismarck to ally himself with it against the Socialists. It established once more its hierarchies in England, Scotland, and Ireland. Its missionaries made large conquests in the Orient and in Africa. It established a hierarchy in Japan. In the United States and Canada its adherents number seventeen millions. It enjoys a tolerable existence in Mexico and South America, where the people are favorable to it, but the passing governments more or less hostile. The loss of the temporal power does not seem to have embarrassed the Popes or diminished their prestige, a fact due perhaps to the growing power of democracy in modern times. The Catholic body is estimated by the experts at 250,000,000, and they are scattered throughout the most important countries of the civilized world. Their devotion to their head gives him a remarkable moral influence in the world. The leaders still discuss the union

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of Christians into one body, and hope for the return of the Orientals and the Lutherans to the Roman Catholic fold.

For exact and popular presentation of the dogmas and history of the Catholic Church, consult Alzog, "Manual of Universal Church History" (Eng. trans., 3 vols., 1874-6); Gibbons, "The Faith of Our Fathers" (1871); Moehler, "Symbolism" (Eng. trans., 1843).

See also the articles ARCHBISHOP; BISHOP; CANON-LAW; CARDINAL; CATHOLIC CHRISTIANITY AND RELIGIOUS UNITY; CONGREGATION; CURIA, PAPAL; GALILICAN CHURCH; INFALLIBILITY; KULTURKAMPF; MASS; ORDER; ROMAN CATHOLIC CHURCH IN THE UNITED STATES; SACRAMENT; SYLLABUS; TRANSUBSTANTIATION; TRENT, COUNCIL OF; VATICAN COUNCIL.

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Roman Catholic Church in the United States. Its missionaries began work among the Indian tribes almost as soon as the explorers found the waterways by which travel could be carried on. In the region called Quebec, which then covered all of old Canada, northern New York, and the States of the nearer West, the Catholic missionaries did excellent work, part of which has been recorded in the fascinating pages of Parkman. In the territories controlled by the Spaniards, such as Florida and Louisiana, they civilized many tribes and brought them into the Christian faith. The same may be said of the old California region, where a real Indian civilization was built up by their efforts. The advance of the English-speaking powers, England first and later the United States, destroyed utterly the work of the missionaries. In Florida first, the English colonists invaded and destroyed the Christian Appalachian tribes; in that part of Quebec which later became American the missions were wiped out; and last of all the American invaders of California destroyed with much wantonness the famous colonies built up by the labors of the Franciscans.

The Church began to exist in what may be called legal form from the year 1789. In that year the Pope appointed Rev. John Carroll (*q. v.*) Bishop of Baltimore in the new Republic, whose first President, George Washington, had taken his seat on March 4 of that year. There were then about 25,000 Catholics in the country, most of whom lived in the State of Maryland. Bishop Carroll had for his episcopal territory the whole United States of that period, which was increased in time by the cession of Louisiana and Florida. In the year 1808 he was made archbishop, and his territory was greatly reduced by placing bishops at New York, Boston, Philadelphia, and Bardstown in Kentucky. As the population increased and the country opened up, bishops

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were placed at the necessary points of vantage, and new provinces were formed, that is, groups of bishops with an archbishop in the most important see. Thus in 1847 St. Louis became the see of an archbishop and the head of a province. In the year 1850 the Pope erected the archbishoprics of New York, New Orleans, Cincinnati, Santa Fé, and Oregon; in 1853 that of San Francisco. Milwaukee Philadelphia and Boston were given archbishops in 1875; Chicago in 1880, St. Paul in 1888, and Dubuque in 1893 completed the list.

Each of these provinces has its group of bishops, each bishop has his body of clergy, and each priest serves a parish; so that at the present time the bishops number 103 in fourteen provinces, the priests number about 15,000, and the people in round numbers 15,000,000. In the government of the Church each bishop is responsible for the management of his diocese only to the Pope, or the papal representative in the country. As the Catholic body is made up of many races, which emigrated from Europe since the country was opened up to emigrants, the bishops and clergy in birth or blood usually represent these races in some degree; and it is the aim of the authorities, and the effort of the people, to secure that representation. Consequently the episcopacy is composed of prelates, either in birth or blood, Irish, German, Belgian, French, Spanish and American. To the older emigrants have been added since 1880 thousands of French-Canadians, Poles, Italians, Bohemians, Lithuanians and Syrians. One of the serious questions in administration is the demand of these people for a representative in the hierarchy as soon as they get a firm footing and an understanding of the American situation.

The new circumstances in the American Republic developed a new application of the ordinary legislation of the Church. In Europe the dioceses are ruled by a body of laws commonly known as the canon-law (*q. v.*), and the usual condition is a strict union of Church and State. In this country the canon-law could not be easily applied, and the general law of the Church took its place. Three plenary councils were held by the American bishops in Baltimore in the years 1829, 1866, and 1884, with the intention of enacting a set of laws that would fit the peculiar conditions existing in America. The third of these councils embraced in its legislation all that had gone before, and secured a body of statutes that for twenty years have done very good service. The more important questions which have engaged the attention of the ecclesiastical leaders, apart from the building up of parishes and churches, have been the unification of the various nationalities, the maintenance of a school system, and the adequate care of the poor. The first has

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been very difficult, owing to the tendency of the various races to renew in America the customs and the exclusiveness of their native land, keeping up its language, and carrying it into all their concerns. The shifting conditions of our life have helped to break up this tendency, the native-born children have resisted it also; but it required the legislation of the Church as well, to aid the children in breaking away from the race-traditions, and to protect them against the intensities of race-feeling.

The question of education is based on the principle that for Christians the training of youth must be thoroughly religious. The Catholic leaders have therefore worked for half a century at the erection of a complete educational system, beginning with the kindergarten, continuing through the usual grades, and finishing with the university. About one million children are trained in their schools, their colleges number forty, and their universities about five. The charity system is based on the command of Christ to help the brethren in need, and the leaders hold that the State institutions do not absolve the people from the duty of charity. The charity system of the Catholic body embraces all forms of human misery, hospitals, asylums for young and old, reformatories for both sexes and all conditions, and the direct visiting of the needy and wretched wherever they may be. The Catholic Church has become a great factor in American life, and its influence has already begun to react on the Church in Europe, where its success, under the régime which declines any union of Church and State, is looked upon as unaccountable. Catholics themselves attribute the growth of the Church to the freedom granted to its citizens by the Republic.

See also ROMAN CATHOLIC CHURCH.

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Roman Catholic Emancipation, the removal of civil and political disabilities to which the Roman Catholics of Great Britain, especially those of Ireland, were once subjected by British laws. Irish Catholics were excluded from public offices and from participation in parliamentary elections. In 1792 they petitioned for abolition of all such restrictions, and in 1793 Parliament granted them partial relief. Insurrections followed, culminating in the Great Rebellion of 1798. In 1800 the union of Ireland with Great Britain was effected, but it was not until 1829 that the Emancipation Act was finally passed.

Romance. Romance has long since lost its original signification in every country except Spain, where it is still occasionally used in speaking of the vernacular, as it was in the Middle Ages when Latin was the language of the lettered classes and of documents and writings of all kinds. But even there its commoner application is, as

elsewhere, not to a language, but to a form of composition. In English it has been almost invariably applied to a certain sort of prose fiction, and, in a secondary sense, to the style and tone prevailing therein. By "the romances," using the term specifically, we generally mean the prose fictions which, as reading became a more common accomplishment, took the place of the lays and "chansons de geste" of the minstrels and trouvères, and were in their turn replaced by the novel. Of these the most important in every way are the so-called romances of chivalry, which may be considered the legitimate descendants of the "chansons de geste." The chivalry romances divide naturally into three families or groups; the British (which, perhaps, would be more scientifically described as the Armorican or the Anglo-Norman), the French, and the Spanish; the first having for its center the legend of Arthur and the Round Table; the second formed round the legend of Charlemagne and the Twelve Peers; and the third consisting mainly of Amadis of Gaul followed by a long series of sequels and imitations of one kind or another. In strict chronological order the Charlemagne cycle should stand first, for the Charlemagne legend was apparently of an earlier formation than the Arthurian; but on the other hand the materials out of which the Arthur legend shaped itself must of course have been the older, and the prose romances which either grew out of it or were grafted upon it are for the most part of an earlier date than those belonging to the Charlemagne story.

The first appearance of Arthur is in the history of Nennius, where he is presented in a quasi-historical shape, simply as the chosen leader of the Britons in 12 successful battles fought with the Saxons; but it is in the "Historia Regum Britanniae" of Geoffrey of Monmouth (1140) that he first appears as the hero of a connected story. Geoffrey, in fact, may be fairly claimed as the founder of the Arthurian legend. Whatever his materials may have been or whatever the source from which he obtained them, he contrived to give them "*un caractère chevaleresque et courtois*," to use the words of M. Gaston Paris, which was altogether foreign to them when they came to his hands, and thus succeeded in presenting a picture of Arthur and his court which at once proved acceptable to the age in which he lived. It is this character, impressed on the Arthur legend by Geoffrey, that led Cervantes to regard it as the fountain-head of chivalry and chivalry romance. The story, however, as Geoffrey left it, is little more than the foundation of the structure raised by his successors a century later. Whether we accept in its entirety or in part only his account of the "very ancient book"

from Brittany which he professed to have translated, or hold that his authorities were simply Nennius, Welsh traditions, and Breton lays and tales, it is clear that his sources of information conveyed no hint of the Round Table or of the Grail, to say nothing of Lancelot and other personages who have come down to us as part and parcel of the Arthurian story.

The first reference to the Round Table is in the "Brut" of Wace (1155), which is in fact an amplified metrical version of Geoffrey's history, and from the words used—"Fist Artus la roonde table, dont Breton dient mainte fable"—we are left to suppose that it was through Breton tradition that it found its way into the story. By some it has been conjectured that in the Round Table we have only an imitation of the Peers of the Charlemagne legend, but in truth the two institutions represented two totally distinct ideas. The peers were simply a fraternity, "*xii. cumpaignuns*," as the "Chanson de Roland" calls them, bound together by mutual affection alone, with no ulterior aim or object, and entirely uninfluenced by the sovereign. The Round Table, on the other hand, was a knightly fellowship in which the bond of union was the pursuit of chivalrous adventures and "deeds of worship," of which the king was the head, and by which he was "upborne" and the quiet and rest of his realm insured. The distinction deserves notice, for it is characteristic of the difference between the two legends and the romances that represent them. The Arthurian stories were knightly and courtly, their authors were courtiers, sometimes knights—if we may trust the statements of early editors, they were written to order at the instance of magnates, among whom Henry II. and Henry III. of England are named, and at any rate were obviously addressed to what would now be called the aristocratic section of society.

With the Carlovingian it was very different; the "chansons de geste" from which they were derived were made for and sung to no one class in particular, and it is manifest that the selection for translation into prose was always governed by considerations of popular interest. Hence the phenomenon noticed by more than one observer, that the Arthurian stories have never become in the strict sense of the word popular in any age or country, while the Carlovingian have enjoyed a widespread popularity, and in some instances continued to hold their own as popular stories down to the present day. J. A. Symonds observes that in Italy the Arthurian stories, though relished by the cultured classes, never took the fancy of the people at large in the same way as the Carlovingian; and in Spain the romances and ballads that treat of Arthur are few and meager, while

the Charlemagne literature is extensive and rich, and the "History of Charlemagne and the Twelve Peers" is still a current chap-book in high request. A more obscure question is how the Holy Grail came to be linked to the Arthurian story. There can be no doubt that Celtic tradition and mythology present sufficient analogies to justify a theory that the idea of the Grail is a purely Celtic one which may be traced back to pagan times. But none of these analogues, not Fionn's healing cup or the mystic basin which figures in "Peredur," can be in any true sense called a Grail. The essence of the Arthurian Grail lies in its character of a Christian relic, and the very name suggests that the conception as it is there presented to us was an Anglo-Norman one. It is very possible, no doubt, that Celtic tradition may have had a share in shaping the conception, but that is all that can be safely said. Some little light, perhaps, is thrown on the question by the curious coincidence between the book presented in a vision in the year 717, which Robert de Borron (*circa* 1190) sets up as the prime authority for his *Saint Greal*, and the vision in the same year in which the Grail itself was seen by a British hermit, as recorded by Helinand in 1204.

The return of the first Crusaders stimulated that enthusiasm for relics of the Passion of which we have a proof in the *Sacro Catino* at Genoa and its rivals. A very natural consequence would be an eagerness to discover the hiding place of the true catino, and this, when the Round Table idea had been once imported into the Arthurian story, would furnish the "deed of worship" par excellence necessary to its constitution, while an equally natural consequence would be that the poets in working out the idea would avail themselves of any floating traditions of mystic vessels endowed with miraculous properties which could be pressed into their service. Arthur himself has, no doubt, been treated in the same fashion. Hero worship is almost always accompanied by annexation. The Charlemagne legend is largely made up of fragments that properly belong to Charles Martel, Pepin, and Charles the Bald. Even in the comparatively modern case of the *Cid*, one of the most famous exploits, the unseating of the French ambassador, is in reality the property of the 15th century *Conde de Cifuentes*. It would be strange if so remote a figure as Arthur's did not show signs of some such process; but even if we find there, as Professor Rhys holds, traces of the culture hero, or of the solar myth, the question of his personality cannot be said to be thereby affected. It would be almost as unreasonable to treat him as a purely mythical being on such grounds, as

to deny Sheridan's existence because jokes attributed to him are to be found in early editions of Joe Miller. There is very little certainty connected with the construction of the Arthurian story. It seems plain that the history of the Grail, which properly should precede the Quest, was in reality a later composition; and the respective shares of Chretien de Troyes and Robert de Borron in the Grail, Perceval, and Lancelot are pretty clearly defined. But in most other respects the Arthurian cycle deserves the title M. Gaston Paris applies to it of "*dédale inextricable*." In no case, as Mr. Alfred Nutt says, do we possess a primary form; all the versions that have come down to us presuppose something earlier; all is uncertainty, the order in which the component parts were produced, the sources from which they were derived, the authors to whom they are attributable, the relationships of the various versions and forms one to another; and research seems ever to reveal new nebulae and discover fresh clusters of difficulties. Even on the question as to whether the primary form was in verse, as analogy would lead us to expect, we are for the most part left to conjecture. That Breton popular poetry may have contained the germs of Tristram, Perceval, and Lancelot is no doubt a probability; but of one thing at least we may be certain, that veritable creations like the Lancelot of the Arthur story could have had no place in the simple naïve *lais* of which we have examples in the translated specimens of Marie de France. The stones may have come from a Celtic quarry, but the building was Anglo-Norman.

It was inevitable that the Arthur stories proper should be followed by romances claiming a supplementary or an introductory character, such as "*Meliadus*," "*Guiron le Courtois*," "*Artus de Bretagne*," and "*Perceforest*," but it would be an injustice to treat these, as Dunlop has done, as though they were legitimate members of the Arthurian cycle, nor have they been admitted into it by the compilers or arrangers who have now and then attempted to present it in a consecutive shape. *Facile princeps* of these is Sir Thomas Malory, whose work is, as Dr. Sommer says in his masterly edition, "by far the best guide to the Arthur romances in their entirety." Malory's judgment may not be, perhaps, invariably impeccable. He has not always chosen the best or most poetical form, and he has left uncultured many beauties of the old MSS. But this may not have been so much his fault as that of the materials with which he had to content himself. Of his general good taste and literary skill there can be as little question as of his English which has made his book one of the classics of his

language. Malory, furthermore, as the exhaustive researches of Dr. Sommer show, is the sole authority for portions of the series, in particular the story of Gareth in the seventh book.

In the romances of the Charlemagne cycle we stand on much firmer ground. It is true that we know even less of the authors than in the case of the Arthur stories, but on the other hand the whole process of production lies plain to view. The starting point of the legend is undoubtedly the disaster of Roncesvalles, and the "Song of Roland"—not, of course, the "Chanson de Roland" that has come down to us, but some older form, the existence and nature of which are matters of inference—may be taken as the foundation of the whole Charlemagne cycle of romance (see *ROLAND*). Of this, apparently, we have a prose version at the end of the Latin history of Charlemagne, which pretends to be the work of his contemporary the Archbishop Turpin. Nothing was farther from the intention of the writers than to produce a romance; but among the romances, or at the head of them, their work must be placed. About its intention there can be no mistake. By Charlemagne's example it points out the advantages here and hereafter of serving the Church liberally and zealously, endowing holy shrines, encouraging pilgrimages, converting the heathen or exterminating them when unconvertible. It records a military pilgrimage to Compostella made by Charles at the call of St. James, and is plainly the work of different hands. M. Gaston Paris believes the first five chapters to have been written by a monk of Compostella about 1050; but it is not very obvious why a Spaniard who had his own national legend of Compostella should have gone out of his way to make a patron of a foreigner and an invader. The remainder, he thinks, was written by a monk of Vienne between 1109 and 1119.

The book was soon translated into French, and became the chief source of the story of Roland and Roncesvalles, for which it was believed to be the prime authority till the discovery of the "chanson" proved the existence of a common ancestor. The influence of the latter was mainly through the "chansons de gestes" of which it was in most cases the model. Of these the number is large. M. Leon Gautier's list enumerates above 100 belonging to the Charlemagne cycle, and this of course only represents survivors. Only a few, however, gave birth to prose romances. The Roland had been forestalled by the Turpin history, and of the others the majority were in interest too local, not sufficiently popular, or for other reasons unsuitable for prose. The story of Ogier le Danois (who possibly had nothing to do with Denmark, but was merely war-

den of the Ardenne-mark) was too famous to be left in the verse of Adenes le Roy; the traditions of the struggles between the sovereign and his vassals in Aquitaine, not so much in Charlemagne's time as in Pepin's, lent an interest to Renaud de Montauban, the Rinaldo of Italian poetry, but best known as the hero of the "Four Sons of Aymon," a romance that has probably never been out of print since the introduction of printing; and similar reasons more or less strong influenced the selection of "Doon de Mayence," "Maugist d' Aygre-mont," "Guerin de Montglave," "Mille et Amys," "Jourdan de Blaves," "Galien Rhetoré," and divers others. One of the most notable, independently of its connection with Don Quixote, is "Fierabras." In the 15th century it was translated into prose by one Jean Baignon of Lausanne, who prefixed to it the early account of Charlemagne by Vincent de Beauvais, and added the concluding chapters of Turpin with the Roncesvalles story, the whole forming a kind of consecutive Charlemagne romance resembling the Arthur compilations. In this shape, and under the title of "La Conqueste du grant roy Charlemaigne des Espaignes," it achieved extraordinary popularity, became a regular chap-book, was translated into Spanish by Nicolas de Piamonte, whose version supplied the balsam of which Don Quixote made trial, and from Spanish into Portuguese about the middle of the 18th century; when it was supplemented by an entirely new Charlemagne romance by the translator, a curious proof of the vitality of the legend.

From the lays of the minstrels of the same period there came also many independent prose romances not necessarily connected with any particular cycle: "Valentine and Orson," which, however, is sometimes linked with the Charlemagne cycle; "Cleomades," or "Clamades," where Cervantes found the magic wooden horse, which by a lapse of memory he assigns to "Pierre of Provence and Magalona," another romance of the same kind; "Partenopeus of Blois"; "Melusina"; "The Knight of the Swan," in some respects the most interesting of all, and curious as an illustration of the growth of a romance. Originally a folklore legend of Brabant, the source of "Lohengrin," the story was turned into a poem and incorporated in the series on Godfrey de Bouillon, who was made descendant of the Knight of the Swan; then it was annexed by Vincent de Beauvais for his "Speculum Historiale," from which it passed into the shape of a romance, and was translated into English at the instigation of Edward, Duke of Buckingham, who claimed to be one of the knight's descendants.

Cervantes correctly claims "Amadis de Gaula" as the founder of Spanish chivalry romance, though he may have been in error as to its being the first work of the kind printed in Spain; the Valencian "Tirant lo Blanch" must have preceded it. It was long held to be of Portuguese origin on the bare statement of Gomez de Azurara that it was entirely the work of Vasco de Lobeira; but there is ample proof that an Amadis was extant in Spain at least as early as the middle of the 14th century, very probably as early as 1300, but at any rate before Lobeira was born. Southey, in whose time the evidence was not forthcoming, may be excused for asserting the Portuguese origin of the romance; but it is strange to find M. Gaston Paris still describing it as "*portugais puis espagnol aux XVe et XVIe siècles*." Whether this Amadis was in verse or in prose is uncertain; we only know from one witness that it was in three books, and Garci de Montalvo, who is responsible for the existing Amadis, merely claims to have corrected three books, which previous editors and scribes had left in a corrupt state, and to have added a fourth. Nor is it a certainty that it was of purely Spanish origin. The influence of the Arthurian romances is manifest, but what is far more suspicious is the absence of Spanish color and indications of Spanish parentage; the names are almost all akin to those of the Arthur stories, the fay Urganda is a distinctly Celtic creation, and the scene throughout is laid on Arthurian ground, Wales, England, Brittany, or Normandy, a choice not easily explained in a romancer whose business was to interest Spanish hearers or readers. But whether or not the original may have been some Northern French story, it certainly was not, as has been sometimes suggested, "Amadas et Ydoine" in which there is no more resemblance to "Amadis" than there is in "Aucassin and Nicolette."

The earliest known edition of the "Amadis" is of 1508, but this cannot be the first; it is too near the date of other romances obviously inspired by it and born of its success, and it is evident that it was finished shortly after the fall of Granada in 1492. The date is significant in its bearing on the curious phenomenon of the sudden outburst of a chivalry romance literature in Spain just as the Middle Ages were drawing to an end and other nations were beginning to put away chivalry among the bric-a-brac of bygone days. But in Spain it marked the close of a campaign of seven centuries and the end of a national life of sustained excitement. Under the new order of things, the triple despotism of crown, Church, and Inquisition, the nobles and minor nobility were left with a superabundance of leisure on their hands, a condition, as every seaside

librarian knows, always favorable to the circulation of fiction, so that Montalvo could not have chosen a better time for his venture. But it would be unjust in the extreme to deny to the merits of the "Amadis" their share in the creation of Spanish chivalry romance. In almost every respect, story, incidents, characters, and human interest, it will bear comparison with the best of its predecessors, and as a romance of chivalry, pure and simple, it has no equal. In this lay the secret of its success. For Spain chivalry romance had a reality unknown elsewhere. "Amadis" came to a generation which had seen round Ferdinand and Isabella knights who could match any of Arthur's or Charlemagne's in exploits. Coming at such a time it is no wonder that "Amadis" was followed by a cry for more, and that more was promptly supplied. But "Esplandian," "Florisando," "Lisuarte," "Amadis of Greece" were of a very different vintage. It was by Feliciano de Silva, the object of Cervantes's special detestation, that the work of continuation was chiefly carried on. He was a clever man, with a facile pen, and if not imagination, at least invention in abundance, but his greatest gift was his intuitive perception of the tastes of his readers. He perceived that it was not so much recreation as excitement they wanted, and that so far from objecting to rant, bombast, and extravagance, the more they got the better they were pleased. He seems to have been the first author who reduced writing nonsense to a system, and also the first who made a handsome fortune by his writings. The professed continuations formed, however, only a small portion of the romances, more or less in imitation of the "Amadis," and infected by the style of Feliciano de Silva, the "Felixmartes," "Belianises," "Olivartes," which continued to flow from the press till the long line ended with "Polisne de Boecia," two years before "Don Quixote" was sent to the press.

With "Don Quixote," fittingly the history of romances as a branch of fiction comes to a close. There are, indeed, two other groups that claim the title, the Pastorals, and those sometimes called the Heroic, an epithet better deserved by the readers who were bold enough to face entertainment in such a formidable shape.

Romance Languages, a general name for those modern languages that are the immediate descendants of the language of ancient Rome. In those parts of the empire in which the Roman dominion and civil institutions had been most completely established the native languages were speedily and completely supplanted by that of the conquerors—the Latin. This was the case in Italy itself, in the Spanish peninsula, in Gaul or France, including parts of

Switzerland, and in Dacia. When the Roman empire was broken up by the irruptions of the Northern nations (in the 5th and 6th centuries) the intruding tribes stood to the Romanized inhabitants in the relation of a ruling caste to a subject population. The dominant Germans continued, where established, for several centuries to use their native tongue among themselves; but from the first they seem to have acknowledged the supremacy of the Latin for civil and ecclesiastical purposes, and at last the language of the rulers was merged in that of their subjects; not, however, without leaving decided traces of the struggle—traces chiefly visible in the intrusion of numerous German words, and in the mutilation of the grammatical forms or inflections of the ancient Latin, and the substitution therefor of prepositions and auxiliary verbs.

It is also to be borne in mind that the language which underwent this change was not the classical Latin of literature, but a popular Roman language (*lingua Romana rustica*) which had been used by the side of the classical, and differed from it—not to the extent of being radically and grammatically another tongue—but chiefly by slovenly pronunciation, the neglect or misuse of grammatical forms, and the use of “low” and unusual words and idioms. As distinguished from the old *lingua Latina*, the language of the Church, the school, and the law, this newly-formed language of ordinary intercourse, in its various dialects, was known from about the 8th century as the *lingua Romana*; and from this name, through the adverb *Romanicé*, came the term romance, applied both to the language and to the popular poetry written in it, more especially to the dialect and poems of the troubadours. The Romance languages recognized by Diez are six—Italian, Spanish, Portuguese, Provençal, French, and Rumanian. Ascoli and newer investigators treat the Romansch of the Grisons as a seventh sister-tongue; and each of these have more or less numerous dialects.

According to the theory of Raynouard, the new language that sprang out of the corruption of the Latin was at first essentially the same over all the countries in which Latin had been spoken, and is preserved to us in a pure state in the Provençal, or language of the troubadours; and it was from this as a common ground, and not from the original Latin, that the several Neo-Latin tongues diverged into the different forms which they now present. This theory is not accepted by recent inquirers; its groundlessness was demonstrated by Cornewall Lewis. It is beyond doubt that the several daughters of the mother Latin had their characteristic differences from the very first, as, indeed, was inevitable. The original Latin spoken in the several provinces of the Ro-

man empire must have had very different degrees of purity, and the corruption in one region must have differed from those in another according to the nature of the superseded tongues. To these differences in the fundamental Latin must be added those of the superadded German element, consisting chiefly in the variety of dialects spoken by the invading nations and the different proportions of the conquering population to the conquered. French, as was to be expected, is richer in German words than any other member of the family, having 450 not found in the others. Italian is next to French in this respect, but on the whole is nearest to the mother Latin. Spanish and Portuguese have considerable Arabic elements; and Rumanian was much modified by Slavic. The Romance tongues further differ from the common parent in simplifying or dropping the inflections of nouns, substituting for these the use of prepositions, and simplifying the verbal forms by a free use of auxiliary verbs. The six great Romance tongues and their literatures are treated in the articles on Italy, Spain, Portugal, Provençal, France, and Rumania, to which may be added the Romansch.

Roman Cement, a dark-colored hydraulic cement, which hardens very quickly and is very durable. The true Roman cement is a compound of pozzuolana and lime ground to an impalpable powder and mixed with water when used. Other cements bearing the same name are made of different ingredients.

Romanesque Architecture, a general term applied to the styles of architecture which prevailed from the 5th to the 12th centuries. Of these there are two divisions: (1) The debased Roman, prevalent from the 5th to the 11th centuries, and including the Byzantine modifications of the Romans, and (2) the late or Gothic Romanesque of the 11th and 12th centuries, comprising the later Byzantine, the Lombard, and the Rhenish, Saxon, and Norman styles. The former is a pretty close imitation of the Roman, with modifications in the application and distribution of the peculiar features; the latter is Gothic in spirit, having a predominance of vertical lines, and various other new features.

Roman Roads, certain ancient roads in Great Britain which the Romans left behind them. They were uniformly raised above the surface of the neighboring land and ran in a straight line from station to station. The four great Roman roads were Watling street, the Fosseway, Icknield street, and Ermine street. Watling street probably ran from London to Wroxeter. The Fosse ran from Seaton in Devonshire to Lincoln. The Icknield Way ran from Icklingham, near Bury St. Edmunds, to Ciren-

cester and Gloucester. The Ermine street ran through the Fenland from London to Lincoln. Besides these four great lines, which were long of great importance for traffic, there were many others.

Romans, Epistle to the, one of the books of the New Testament, written by the Apostle Paul, and addressed to the Christian Church at Rome. It is the 5th in order of time, though placed first among the epistles, either from the predominance of Rome, or because it is the longest and most comprehensive of the apostle's epistles. It is generally agreed to have been written about A. D. 58, after he had passed through a lengthened period of experience. That it is the genuine and authentic production of the apostle has rarely been called in question, and is supported by the strongest evidence. It was written from Corinth, and sent to Rome by one Phœbe, a servant or deaconess of the Church at Corinth. The occasion of it was, doubtless, the disputes that began to prevail among the Christians at Rome. The Church there was composed of both converted Jews and Gentiles, and the former, attached to the Mosaic institutions, were desirous of imposing on their Gentile fellow-worshippers many of the Mosaic rites and ceremonies, especially that of circumcision. The Gentiles, on the other hand, despised the prejudices of the Jews; and hence the divisions and contentions among them which called forth the admonitions and cautions contained in this epistle.

Romansch, Romansh, or Roumansch, a dialect spoken in the Grisons of Switzerland. It is based on or corrupted from the Latin.

Romanticism, a movement in feeling and thought that has transformed the literature and art of most nations, has been defined by Theodore Watts as "the renaissance of the spirit of wonder in poetry and art." It was a revolt against pseudo-classicism; a return from the monotonous commonplace of every-day life to the quaint and unfamiliar world of old romance; a craving for the novel, original, and adventurous; an emphasizing of the interesting, the picturesque, the "romantic," at the expense, if need be, of correctness and elegance and the current canons of "good taste." Deep humor, strong pathos, profound pity are among its notes. Romanticism is not necessarily limited to any one period; there are romantic elements in Homer, Æschylus, Sophocles; the poetry of Dante is eminently romantic when contrasted with ancient classical poetry as a whole; but though what is romantic for one generation tends to become classic — and so tame, though not really insipid — for a later one, and though the romantic is almost inevitably one side of a truly artistic temperament, there are

certain epochs that are specially romantic, and certain writers in those epochs more romantic than their fellows. The 18th century was notoriously classic in ideal, or pseudo-classic — conventional, pedantic, academic; and the revolt against spiritual ennui which followed is the romantic movement par excellence. The movement arose under various conditions in the several countries, had a somewhat varying character and course, and sometimes tended toward the merely crude and grotesque. In England, the fountainhead of the movement which culminated in the beginning of the 19th century, it may be traced from the Percy Ballads and Chatterton, from Cowper and Blake and Burns, to Scott and Byron, Wordsworth and Coleridge, Keats and Rossetti. In Germany there were tendencies in that direction in Lessing, in Schiller, in Goethe, as well as in the philosophy of Schelling, and the "Sturm und Drang" period was largely romantic in its temper; but it was Novalis who was the prophet of "romanticism," and among the other representatives of the school were the Schlegels, Tieck, Kleist, Fouqué, and Hoffmann. In France beginnings are found in Rousseau, in Chateaubriand, and others; but the great chief of French romanticism is Victor Hugo. Other French romantics are Lamartine, Dumas, Gautier, George Sand, Flaubert, Mürrer. In Germany romanticism included with the love of the mediæval an affection for the Oriental; in religion it led some of its notable representatives to Catholic ideals and into the Catholic Church; and in politics it was associated with reactionary conservatism. In music Weber has been called the "creator of romantic opera." Berlioz is regarded as the type of French romanticism in music. See ROMANCE.

Roman Walls, certain walls or ramparts in Great Britain constructed by the Romans. The most celebrated of these is the wall built by Hadrian (A. D. 120) between the Tyne and the Solway. It was further strengthened by Severus, and hence is often called the wall of Severus. In 139 Lollius Urbicus built a second wall or N. rampart between the Forth and the Clyde, which occupied the same line as the chain of forts built by Agricola (A. D. 80–85). It is known as the wall of Antoninus. These walls formed the N. boundaries of the Roman dominions in Great Britain, and were built to prevent the incursions of the Picts and Scots.

Rome, a city and county-seat of Floyd co., Ga.; on the Coosa river, and on the Southern, the Western and Atlantic, and the Chattanooga, Rome and Columbus railroads; 72 miles N. W. of Atlanta. Here are a high school, Shorter College for Women

Rome

(Bapt.); Battey and Emergency Hospitals, waterworks, electric lights, street railroads, National and State banks, and daily and weekly periodicals. There is a large trade in cotton and general merchandise. The city has plow works, foundries,

Rome

canals, and the Rome, Watertown, and Ogdensburg, the New York, Ontario, and Western, and the New York Central and Hudson River railroads; 15 miles W. of Utica. Here are St. Peter's Academy for Young Ladies, the State Custodial Asylum, the



ROME PERSONIFIED.

a rolling mill, stove works, furniture factory, planing mills, and a noted cotton mill, and an assessed property valuation of nearly \$5,000,000. Pop. (1890) 6,957; (1900) 7,291; (1910) 12,099.

Rome, a city in Oneida co., N. Y.; on the Mohawk river, the Erie and Black River

Central New York Institute for Deaf Mutes, County Court House, County Home, city hospital, street railroad and electric light plants, waterworks, the Jervis Library, National and savings banks, and several daily and weekly newspapers. The city has locomotive and farming implement works, machine shops, and cigar factories, and an

assessed property valuation of over \$7,000,000. Pop. (1900) 15,343; (1910) 20,497.

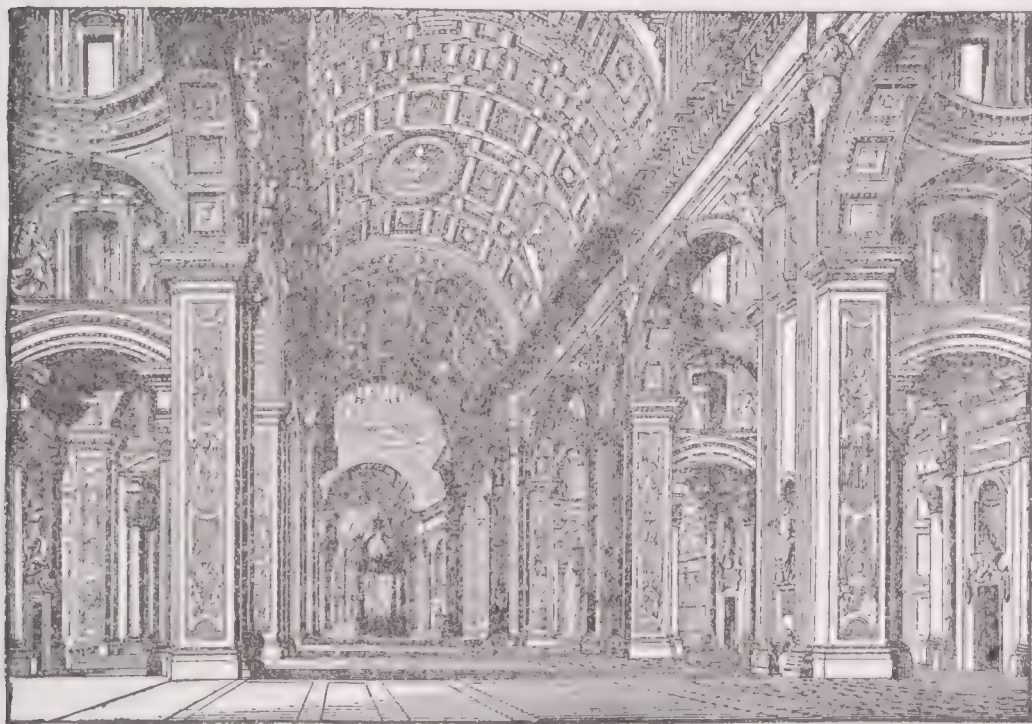
Rome, the most powerful State of antiquity; founded about 753 B. C. by a settlement from Alba Longa led by ROMULUS (*q. v.*). At first the new city was ruled by kings, but in 509 B. C. the people established a republic which lasted for 500 years. Its most important feature was the struggle between the plebeians and the patricians, settled finally in 286 B. C., by admission of plebeians to a share in the government. Meanwhile Rome had been gradually spreading out, and by 275 B. C. was mistress of all Italy.

The next 30 years were crucial in the history of Rome. Her aggressive policy in the Mediterranean brought her face to face with CARTHAGE (*q. v.*), and under their military genius HANNIBAL (*q. v.*) the Carthaginians threatened the very existence of Rome itself

MARCUS AURELIUS (*q. v.*) the decline began. From A. D. 180 to 284 (see TRAJAN) Rome grew gradually weaker. In 284 DIOCLETIAN (*q. v.*) reorganized the empire, and for nearly 200 years these reforms delayed the inevitable disruption; but in 395 the empire separated into two divisions; the Eastern, or BYZANTINE (*q. v.*) and the Western; and in 476 the Western, or Roman empire was finally overthrown, and Odoacer, a German became King of Italy. See ITALY: LATIN LANGUAGE.

Rome, the capital of Italy, as formerly of the Roman empire, republic, and kingdom, and long the religious center of Western Christendom, is one of the most ancient and interesting cities of the world. It stands on both sides of the Tiber, about 15 miles from the sea, the river here having a general direction from N. to S., but making two nearly equal bends, the upper of

which incloses a large alluvial flat, little raised above the level of the stream, and well known by the ancient name of Campus Martius. A large part of the modern city stands on this flat, but the ancient city lay mostly to the E. and S. E. of this, occupying a series of eminences of small elevation known as the seven hills of Rome (the Capitoline, the Palatine, the Aventine, the Quirinal, the Viminal, the Esquiline, and the Cælian Hill), while a small portion stood on the other side of the river, embracing an eighth hill (Janiculum). The city is tolerably healthy



ROME: INTERIOR OF ST. PETER'S.

(see PUNIC WARS). Carthage was finally burned to the ground in 146 B. C. By 133 B. C. Rome had conquered Macedonia and Asia Minor.

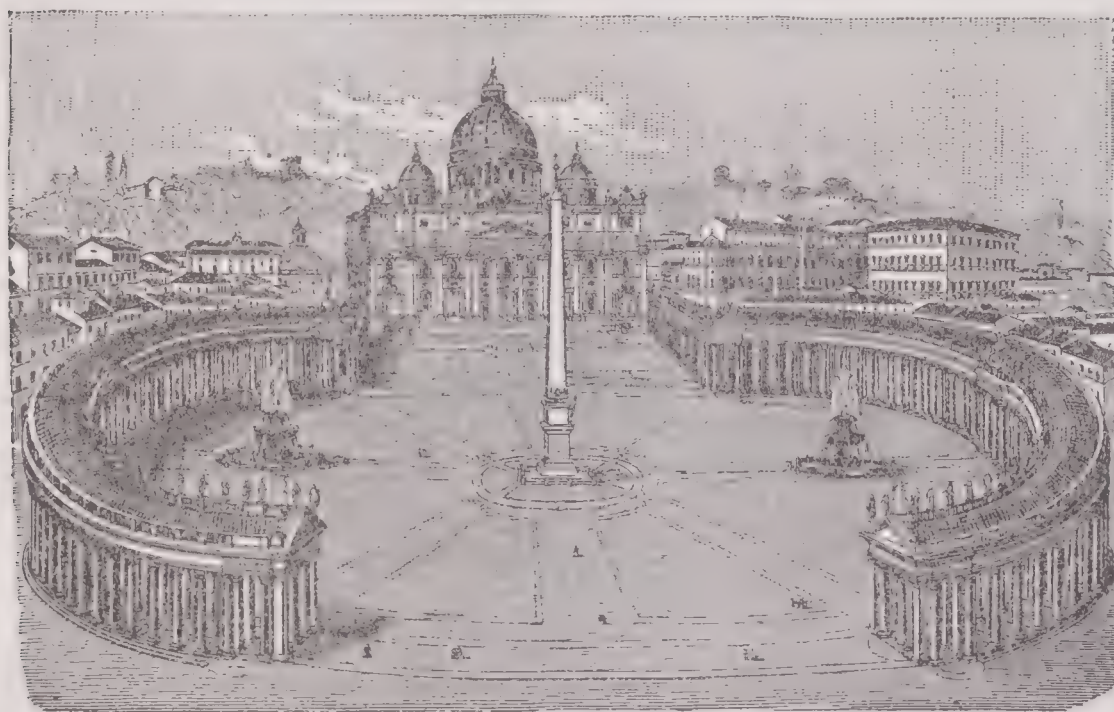
At this point begins the decline of Rome as a republic. A series of bitter civil wars centralized the governing power in the hands of a few leaders (see SULLA: MARIUS: POMPEY: CÆSAR: TRIUMVIRATES); and in 48 B. C. Julius Cæsar was created Emperor. With Cæsar the republic and Rome's greatest period come to an end. Under the republic the power of Rome had been extended from Arabia to Great Britain, and from Spain to Armenia. See MITHRIDATES.

In 27 B. C. Octavian became first emperor of Rome under the title of AUGUSTUS (*q. v.*). His immediate successors added slightly to Roman territory, but under

during most of the year, but in late summer and early autumn malaria prevails to some extent. It has been greatly improved in cleanliness and healthfulness since it became the capital of modern Italy.

Ancient Rome, Topography, etc.—The streets of ancient Rome were crooked and narrow, the city having been rebuilt, after its destruction by the Gauls in 390 B. C., with great haste and without regard to regularity. The dwelling houses were often very high, those of the poorer classes being in flats, as in modern continental towns. It was greatly improved by Augustus, who extended the limits of the city and embellished it with works of splendor. The Campus Martius during his reign was gradually covered with public buildings, temples, porticoes, theaters, etc. The general character of the city, however, remained much the same till after the fire that took place in

Nero's reign, when the new streets were made both wide and straight. In the reign of Augustus the population is believed to have amounted to about 1,300,000, and in that of Trajan was not far short of 2,000,000. Rome is said to have been surrounded by walls at three different times. The first of these was ascribed to Romulus, and inclosed only the original city on the Palatine. The second wall, attributed to Servius Tullius, was 7 miles in circuit, and embraced all the hills that gave to Rome the name of the City of Seven Hills. The third wall is known as that of Aurelian, because it was begun and in great part finished by the emperor of that name. It is mostly the same with the wall that still bounds the



ROME: ST. PETER'S WITH COLONNADES.

city on the left or E. bank of the Tiber; but on the right or W. bank, the wall of Aurelian only embraced the summit of the Janiculum and a district between it and the river, whereas the more modern wall on that side (that of Urban VIII.) embraces also the Vatican Hill. The wall of Aurelian was about 11 miles in length, that of modern Rome 14 miles. Ancient Rome had eight or nine bridges across the Tiber, of which several still stand. The open spaces in ancient Rome, of which there were a great number, were distinguished into *campi*, areas covered with grass; *fora*, which were paved; and *areæ*, a term applied to open spaces generally, and hence to all those which were neither *campi* nor *fora*, such as the squares in front of palaces and temples. Of the *campi* the most celebrated was the Campus Martius already mentioned, and after it the Campus Esquilinus on the E. of the city. Among the latter the Forum Romanum, which lay N. W. and S. E. between the Capitoline and Palatine Hills; and the Forum of Trajan, between the Capitoline and Quirinal, are the most worthy

of mention. The first was the most famous and the second the most splendid of them all. The great central street of the city was the Via Sacra (Sacred Way), which began in the space between the Esquiline and Cælian Hills, proceeded thence first S. W., then W., then N. W., skirting the N. E. slope of the Palatine, and passing along the N. side of the Forum, and terminated at the base of the Capitoline. The two principal roads leading out of Rome were the Via Flaminia (Flaminian Way) or great N. road, and the Via Appia (Appian Way) or great S. road.

Ancient Buildings.—Ancient Rome was adorned with a vast number of splendid buildings, including temples, palaces, public halls, theaters, amphitheaters, baths, porticoes, monuments, etc., of many of which we can now form only a very imperfect idea. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods (now Church of S. Maria Rotonda), is still in excellent preservation. It is a great circular building with a dome roof of stone 140 feet wide and 140 feet high, a marvel of construction, being 2 feet wider

than the great dome of St. Peter's. The interior is lighted by a single aperture in the center of the dome. Other temples were the Temple of Apollo, which Augustus built of white marble, on the Palatine, containing a splendid library, which served as a place of resort to the poets; the Temple of Minerva, which Pompey built in the Campus Martius, and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful temple in Rome, built by Vespasian, in the Via Sacra, which contained the treasures of the temple of Jerusalem, a splendid library, and other curiosities, but was burned during the reign of Commodus; the temple of the Sun, which Aurelian erected to the E. of the Quirinal; and the magnificent temple of Venus, which Cæsar caused to be built to her as the origin of his family. The principal palace of ancient Rome was the Palatium or imperial palace, on the Palatine Hill, a private dwelling house enlarged and adopted as the imperial residence by Augustus. Succeeding emperors extended and beautified it.

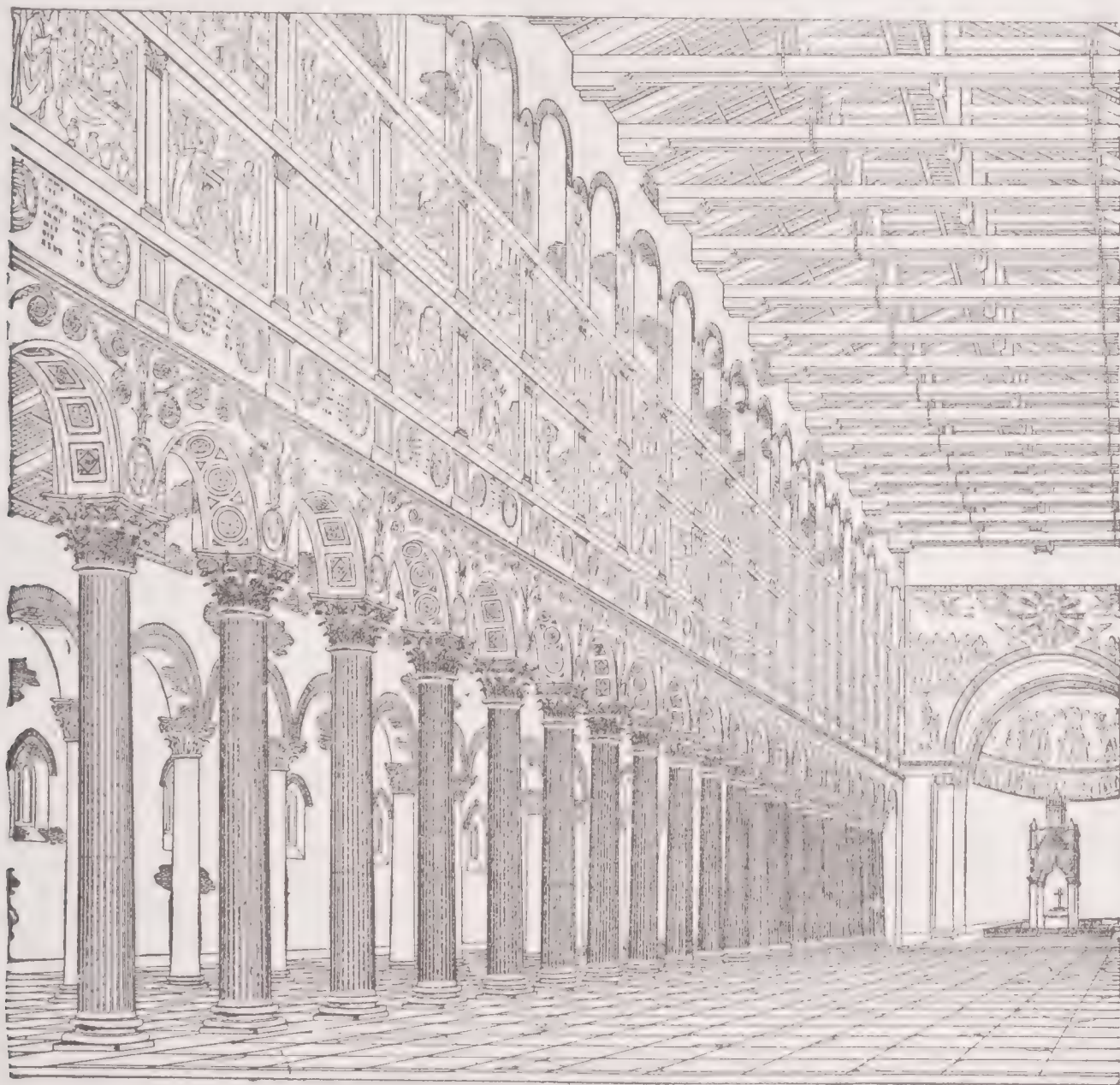


ROME PIAZZA NAVONA (ABOVE); PIAZZA DEL POPOLO (BELOW).

Nero built an immense palace which was burned in the great fire. He began to replace it by another of similar extent, which was not completed till the reign of Domitian. Among the theaters, those of Pompey, Cornelius Balbus, and Marcellus were the most celebrated. That of Pompey, in the Campus Martius, was capable of containing 40,000 persons. Of the Theater of Marcellus, completed 13 B. C., a portion still remains. The most magnificent of the amphitheaters was that of Titus, completed A. D. 80, now known as the Coliseum or Colosseum. Though only one-third of the gigan-

tus; and the Basilica Porcia, which was built by Cato the censor.

The public baths or *thermæ* in Rome were also very numerous. The largest were the Thermæ of Titus, part of the substructure of which may still be seen on the Esquiline Hill; the Thermæ of Caracalla, even larger, extensive remains of which still exist in the S. E. of the city; and the Thermæ of Diocletian, the largest and most magnificent of all, part of which is converted into a church. Of the triumphal arches the most celebrated are those of Titus (A. D. 81), Severus (A. D. 203), and that of Constantine (A. D. 311),



ROME: ST. PAUL WITHOUT THE WALLS.

tic structure remains, the ruins are still stupendous. The principal of the circuses was the Circus Maximus, between the Palatine and Aventine, which was capable of containing 260,000 spectators. With slight exception its walls have entirely disappeared, but its form is still distinctly traceable. The porticoes or colonnades, which were public places used for recreation or for the transaction of business, were numerous in the ancient city, as were also the basilicas or public halls. Among them may be noticed the splendid Basilica Julia, commenced by Cæsar and completed by August-

all in or near the Forum and all well preserved structures; that of Drusus (B. C. 8), in the Appian Way, much mutilated; that of Gallienus (A. D. 262) on the Esquiline Hill, in a degraded style of architecture. Among the columns the most beautiful was Trajan's Pillar in the Forum of Trajan, 117 feet in height, still standing. The bas-reliefs with which it is enriched, extending in spiral fashion from base to summit, represent the exploits of Trajan, and contain about 2,500 half and whole human figures. A flight of stairs within the pillar leads to the top. The most celebrated

of ancient sewers is the Cloaca Maxima, ascribed to Tarquinius Priscus, a most substantial structure, the outlet of which is still to be seen.

The Roman aqueducts were formed by erecting one or several rows of arches superimposed on each other across a valley, and making the structure support a waterway or canal, and by piercing through hills which interrupted the watercourse. Some of them brought water from a distance of upward of 60 miles. Among others, the Aqua Paola, the Aqua Trajana, and the Aqua Marzia, still remain, and contribute to the supply of the city, and also its numerous important ornamental fountains. Among the magnificent sepulchral monuments, the chief were the mausoleum of Augustus in Campus Martius; and that of Hadrian, on the W. bank of the Tiber, now the fortress of modern Rome, and known as the Castle of St. Angelo. The city was also rich in splendid private buildings, and in the treasures of art, with which not only the public places and streets, but likewise the residences and gardens of the principal citizens, were ornamented, and of which comparatively few vestiges have survived the ravages of time. The catacombs of Rome are subterranean galleries which were used as burial places and meeting places, chiefly by the early Christians, and which extend under the city itself as well as the neighboring country. The chief are the catacombs of Calixtus, St. Prætextatus on the Via Appia; of St. Priscilla, 2 miles beyond the Porta Salora; of St. Agnese, outside the Porta Pia; of S. Sebastiano, beneath the church of that name; etc. See CATA-COMBS.

Modern Rome.—It was not till the 17th century that the modern city was extended to its present limits on the right bank, by a wall built under the pontificates of Urban VIII. (1623–1644) and Innocent X. (1644–1655), and inclosing both the Janiculum and the Vatican hills. The boundary wall on the left or E. bank of the river follows the same line as that traced by Aurelian in the 3d century, and must in many parts be identical with the original structure. The walls on both banks are built of brick, with occasional portions of stone work, and on the outside are about 55 feet high. The greater part dates from A. D. 271 to 276. The city is entered by 12 gates (several of those of earlier date being now walled up) and several railway accesses. Since Rome became the capital of united Italy great changes have taken place in the appearance of the city, many miles of new streets being built, and much done in the way of paving, drainage, and other improvements. It has thus lost much of its ancient picturesque appearance, and is rapidly acquiring the look of a great modern city with wide

straight streets of uniform-looking tenements having little distinctive character. It is still, however, replete with ever varying and pleasing prospects. The extensive excavations carried out have laid completely bare the remains of many of the grandest monuments of ancient Rome, notably the whole of Forum Romanum and the Via Sacra, the remains of the Temples of Saturn and of Castor and Pollux, the Temples of Vespasian, of Antoninus and Faustina, the Temple of Vesta, etc. A great number of villas and palaces and countless works of art have been brought to light. The villa-gardens, which have been for ages a distinctive feature of Rome, are rapidly disappearing, and are being covered with tenement houses, and new suburbs are springing up on every side. There are seven bridges across the Tiber within the city.

Streets, Squares, etc.—Among the principal streets and squares of modern Rome are the Piazza del Popolo immediately within the Porta del Popolo on the N. side of the city near the Tiber, with a fine Egyptian obelisk in its center, and two handsome churches in front, standing so far apart from each other and from the adjoining buildings as to leave room for the divergence of three principal streets, the Via di Ripetta, the Corso, and the Via del Babuino. The Corso stretches for upward of a mile in a direct line to its termination at the Piazza di Venezia, not far from the Capitol, and is the finest street in the city. The appearance of the Capitol has been entirely altered to permit the erection of a monument to Victor Emmanuel. The Via del Babuino proceeds first directly to the Piazza di Spagna, thence to the Quirinal, and by a tunnel opens out on the Esquiline. It contains a large number of handsome edifices. The whole of the city to the E. of this street, and in the triangular space included between it and the Corso, is well aired and healthy, and is regarded as the aristocratic quarter. The Ghetto, or Jews' quarter, which occupied several mean streets parallel to the river and connected by narrow lanes, was cleared away by the municipal improvements in 1889. The city is supplied with good water partly by the above mentioned aqueducts, which, constructed under the greatest difficulties 25 centuries ago, still serve the purpose for which they were built, and remain monuments of engineering skill.

The chief open spaces besides the Piazza del Popolo are the Piazza S. Pietro, with its extensive colonnade; the Piazza Navona, adorned with two churches and three fountains, one at each extremity and the third in the center; the Piazza di Spagna, adorned by a monumental pillar and a magnificent staircase of travertine, leading to the Church of Trinità de' Monti, conspicuously

seated on an eminence above it; the Piazza Barberini, beside the palace of the same name, adorned by a beautiful fountain; the Piazza Colonna, in the center of the city, with column of Marcus Aurelius; near it, in the Piazza di Monte Citorio, is the spacious Chamber of Deputies. Larger spaces for amusement or exercise have been formed only in a few spots. One of the finest is the Pincio, or "hill of gardens," overlooking the Piazza del Popolo, and commanding a fine view. It is a fashionable drive toward evening, and presents a gay and animated appearance. At a short distance outside the walls on the N. of the city is the Villa Borghese, forming a finely planted and richly decorated park of 3 miles in circuit, which, though private property, forms the true public park of Rome and is the favorite resort of all classes. Various localities in and near Rome that were malarious have been rendered healthy by planting eucalyptus trees.

Churches.—The most remarkable of these is the Cathedral of St. Peter, the largest and most imposing to be found anywhere. Another remarkable church is that of San Giovanni in Laterano, on an isolated spot near the S. wall of the city. It was built by Constantine the Great, destroyed by an earthquake in 896, reërected (904–911), burned in 1308, restored and decorated by Giotto. Again burned in 1360, rebuilt by Urban IV. and Gregory XI., and has undergone various alterations and additions from 1430 till the present façade was erected in 1734. A modern extension has involved the destruction of the ancient apse. From the central balcony the Pope pronounces his benediction on Ascension day; and the church is the scene of the councils which bear its name.

Other churches are those of Santa Maria Maggiore (352); Santa Croce; San Clement, containing a number of interesting frescoes by Masaccio; Il Gesu, the principal church of the Jesuits, with the façade and cupola by Giacomo della Porta (1577); and an interior enriched with the rarest marbles and several fine paintings, and containing the monument of Cardinal Bellarmine; Sta. Maria-delli-Angeli, originally a part of Diocletian's Baths, converted into a church by Michael Angelo, one of the most imposing which Rome possesses, and containing an altar piece by Muziano, a fine fresco by Domenichino, and the tomb of Salvator Rosa; Sta. Maria in Ara Cœli, on the Capitoline, a very ancient church approached by a very long flight of stairs, remarkable for its architecture and for containing the figure of the infant Christ called the *santissimo bambino*; Sta. Maria in Cosmedin, at the N. base of the Aventine, remarkable for its fine Alexandrine pavement and its lofty and beautiful campanile

of the 8th century; Sta. Maria sopra Minerva, so called from occupying the site of a temple of that goddess, begun in 1285 and restored 1848–1855, remarkable as the only Gothic church in Rome; Sta. Maria in Dominica or della Navicella, on the Cælian, is remarkable for 18 fine columns of granite and two of porphyry, and the frieze of the nave painted in camieau by Giulio Romano and Perino del Vago. Among other churches are Sta. Maria della Pace, celebrated for its paintings, particularly the four Sibyls, considered among the most perfect works of Raphael; Sta. Maria del Popolo, interesting from the number of its fine sculptures and paintings (Jonah by Raphael, ceiling frescoes by Pinturicchio, and mosaics from Raphael's cartoons by Aloisio della Pace); Sta. Maria in Trastevere, a very ancient church, first mentioned in 449 and San Paolo from le Mura.

Palaces, Picture Galleries, etc.—The Vatican, adjoining St. Peter's, comprises the old and new palaces of the Popes (the latter now the ordinary papal residence), the Sistine chapel, the Loggie and Stanze, containing some of the most important works of Raphael, the picture gallery, the museums (Pio-Clementino, Chiaramonti, Etruscan and Egyptian), and the library (220,000 volumes and over 25,000 MSS.). The palace of the Quirinal was formerly a favorite summer residence of the Popes, but is now occupied by the King of Italy. The Palazzo della Cancelleria is the only palace on the left bank of the river still occupied by the ecclesiastical authorities. The building was designed by Bramante, and is one of the finest in Rome. A series of palaces crowns the summit of the Capitol, and surrounds the Piazza del Campidoglio. It is approached from the N. W. by a flight of steps, at the foot of which two Egyptian lions, and at the summit two colossal statues of Castor and Pollux standing beside their horses, are conspicuous. In the center of the piazza is a bronze equestrian statue of Marcus Aurelius (161–181). On the S. E. side of the piazza is the Senatorial Palace, in which the senate holds its meetings. The building also contains the offices of the municipal administration and an observatory. Its façade was constructed by Giacomo della Porta, under the direction, it is said, of Michael Angelo. On the S. W. side of the piazza is the palace of the Conservatori, containing a collection of antique sculpture, including objects of art discovered during the recent excavations, and a gallery of pictures. Opposite is the museum of the Capitol, with interesting objects of ancient sculpture and a picture gallery.

Among private palaces may be noted the Palazzo Barberini, on the Quirinal, with a collection of paintings. The library attached to it has numerous valuable MSS., with

some other literary curiosities. The Palazzo Borghese, begun in 1590, has a fine court surrounded by lofty arcades, but is chiefly celebrated for its picture gallery, containing the Aldobrandi Marriage and some other works of great renown. The Palazzo Colonna has a picture gallery and a beautiful garden containing several remains of antiquity. The Palazzo Corsini has a picture gallery, garden, and collection of MSS. and printed books of great value. The Palazzo Farnese, one of the finest in Rome, built under the direction of Antonio da Sangallo, Michael Angelo, and Giacomo della Porta in succession. The celebrated antiquities it once contained (Farnese Bull, Hercules, Flora, etc.), are now in the Museum of Naples. The Palazzo Rospigliosi, erected in 1603, contains some valuable art treasures; among others, on the ceiling of a casino in the garden is the celebrated fresco of Aurora by Guido. Villa Ludovisi, situated in the N. of the city, the ancient gardens of Sallust, contains a valuable collection of ancient sculptures. Villa Farnesina, on the right bank, containing Raphael's charming creations illustrative of the myth of Cupid and Psyche.

Educational Institutions, Charities, etc.—Among educational institutions the first place is claimed by the university, founded in 1303. The most flourishing period of the university was the time of Leo X. (1513–1522), under whom the building still occupied by it was begun. Attached to the university are an anatomical and a chemical theater, and cabinets of physics, mineralogy, and zoölogy, as also botanic gardens, and an astronomical observatory. The university is attended by about 1,000 students. The Collegio Romano, formerly a Jesuit college, now contains the Archæological Museum and the recently established library, Biblioteca Vittorio Emanuele—consisting mostly of the old library of the Jesuits, augmented by the libraries of suppressed monasteries (about 500,000 volumes). The Collegio de Propaganda Fide has acquired great celebrity as the establishment where Roman Catholic missionaries are trained. The Accademia di San Luca, for the promotion of the fine arts, is composed of painters, sculptors, and architects, and was founded in 1595 and reorganized in 1874. Connected with it are a picture gallery and schools of the fine arts. Other associations and institutions connected with art, science, or learning are numerous; one of them, the Accademia de' Lincei, founded in 1603 by Galileo and his contemporaries, is the earliest scientific society of Italy. Besides the Vatican and Vittorio Emanuele libraries mentioned above, the chief are the Biblioteca Casanatense; the Biblioteca Angelica, and the Biblioteca Berberini. For elementary education much has been done since

the papal rule came to an end. Hospitals and other charitable foundations are numerous. The chief theaters include the Teatro Apollo, Teatro Argentina, Teatro Valle, the Capranica, Metastasio, Rossini, and the Costanzi.

Trade and Manufactures.—The external trade is unimportant, and is carried on chiefly by rail, the Tiber being navigated only by small craft. There are railway lines connecting with the general system of Italy; and steamers from Civita Vecchia to Naples, Leghorn, and Genoa. The chief manufactures are woolen and silk goods, artificial flowers, earthenware, jewelry, musical strings, mosaics, casts, and objects of art. The trade is chiefly in these articles, and in olive oil, pictures, and antiquities.

History.—The ancient history of Rome has already been given. From the downfall of the empire its history is mainly identified with that of the papacy. An important event in its history is its capture and sack by the troops of the Constable of Bourbon in 1527. In 1798 Rome was occupied by the French, who stripped the palaces, churches, and convents of many works of art and objects of value. Pope Pius VI. was taken prisoner to France, where he soon afterward died, and a Roman republic was set up. In 1848 Pope Pius IX. was driven from Rome, and another Roman republic formed under Mazzini and Garibaldi. A French army was sent to the Pope's assistance, and after a determined resistance Rome was captured by the French in July, 1849, and the Pope returned and resumed his power under the protection of French bayonets (April, 1850). The rule of the Pope continued till Oct. 1870, when Rome was occupied by the Italian troops on the downfall of the French empire, and in June, 1871, the "Eternal City" became the capital of united Italy. The king took up his residence in the Quirinal; and to accommodate the legislature and various public departments numerous conventual establishments were expropriated. The population of the city has of late vastly increased. In 1870 it was 226,022; in 1881, 276,463; and in 1909 it was officially reported at 575,000.

Rome of Hindustan, the city of Agra, on the Jumna river. It was the seat of the Mohammedan empire in India, and its ancient structures are on a scale of great magnificence.

Rome of Protestantism, the city of Geneva in Switzerland. Under the guidance of Calvin and his associates it became a stronghold of the Reformation.

Romero, Don Matias, a Mexican diplomatist; born in Oxaca, Mexico, Feb. 24, 1837; was graduated at the Academy of Theoretical and Practical Law, Mexico City, in 1855. He was admitted to the bar in 1857 and at an early age entered

public life, being sent to Washington, D. C., as secretary of the Mexican legation in 1859. In 1860 he was made charge d'affaires, but in 1863 returned to Mexico to take part in the war against the French. Subsequently he was made minister to the United States; Secretary of the Treasury of Mexico, and postmaster-general. In 1882 he was reappointed minister to the United States and remained so till his death. He was a member of the International American Conference and was a prolific writer, publishing upward of 50 volumes of technical reports. He died in Washington, D. C., Feb. 30, 1898.

Romey, Louis Charles Réparat Geneviève Octave, a French historian; born in Paris, France, Dec. 26, 1804. After extensive travels, and a long sojourn in Spain, where he studied its history and literature, he returned to France and began to work

the eloquence with which he urged the amelioration of the cruel and barbarous penal code which then prevailed. His efforts, though not attended with great success during his life, certainly hastened the just and necessary reforms which subsequently were effected, and entitle him to the name of a great and merciful reformer. Sir Samuel Romilly was at the height of popularity and reputation, when, in a fit of temporary insanity, caused by grief at his wife's death, he committed suicide, Nov. 2, 1818.

Romney, George, an English painter; born in Rickside, Lancashire, Dec. 15, 1734. He was the son of a carpenter, and at first worked at his father's trade, but he afterward was apprenticed to an itinerant artist named Steele, and at the age of 23 began the career of a painter. After a certain amount of local success he went to London



ROMULUS AND REMUS.

upon his "History of Spain from its Early Days to the Present Time" (1838-1851); a history of great merit, but one which he never completed. His other writings include: "Châteaubriand as Prophet" (1849); "Ancient and Modern Russia" (1855); "A Voyage among my Books" (1861); "Men and Things of Various Times" (1864); many translations, notably that of "Uncle Tom's Cabin" (1853); and many valuable contributions to periodicals. He died in Paris in April, 1874.

Romilly, Sir Samuel, an English lawyer; born in London, March, 1757. He was called to the bar in 1783, and gradually rose to be leader in the Court of Chancery. In 1805 he was appointed chancellor of Durham, and next year he became solicitor-general under Fox and Grenville, though he had not previously sat in Parliament. At the same time he was knighted. When his party went out of office he remained in Parliament, where he became distinguished by his talent in debate, and particularly by

in 1762, and next year won a prize offered by the Society of Art for a historical composition. He steadily rose in popularity, and was finally recognized as inferior only to Reynolds and Gainsborough as a portrait-painter; some critics even placed him higher than either. His residence in London was interrupted by occasional visits to the Continent for purposes of study, and his most prosperous period dates from 1775, after his return from a visit of 18 months to Rome. Many distinguished Englishmen and many ladies of rank sat to him for their portraits; but perhaps the most beautiful of his sitters was Emma Hart, afterward Lady Hamilton, whom he depicted in very numerous characters. He did not neglect historical or imaginative compositions, and he contributed several pictures to Boydell's famous Shakespeare gallery, founded in 1786. His health began to fail in 1797, and in 1799 he rejoined his wife (married in 1756), who throughout his whole London career had remained at Kendal. Romney

Romulus

displays a want of carefulness, and defective knowledge of anatomy in his historical compositions; but he atones for these faults by fine color, a subtle sense of beauty, and by his originality. Fine examples of his work command high prices. He died in Kendal, Nov. 15, 1802.

Romulus, mythical founder and first King of Rome. According to the legends, he was the son of the vestal Rhea Sylvia by the god Mars, Sylvia being a daughter of Numitor, rightful heir of the King of Alba, but deprived by his brother. Exposed with his twin brother Remus, the babes were suckled by a she wolf, and afterward brought up by a shepherd. Their parentage was discovered, and they determined to found a city on the banks of the Tiber, the scene of their exposure. The right to choose the site was acquired by Romulus; and Remus not acquiescing, in his disappointment, was slain. Inhabitants for the new city were found by establishing a refuge for murderers and fugitive slaves on the Capitoline hills, and by carrying off the Sabine maidens at a feast to which they were invited. This led to war with the Sabines, which ended, through the intervention of the Sabine women, in a union of Romans and Sabines, under their two kings, Romulus and Titus Tatius. The latter was soon slain, and Romulus reigned alone. He was regarded as the author of the fundamental division of the people into *tribes*, *curiæ*, and *gentes*, and of the institution of the senate and the *comitia curiata*. The date commonly assigned for the foundation of Rome is 753 B. C.

The tomb in which the body of Romulus is alleged to have been interred was discovered in January, 1899, in the Roman Forum, near the arch of Septimius Severus, along the Via Sacra. A large slab of black marble, measuring four square meters, was found, exactly corresponding to the description of the tomb of Romulus alluded to by Varro as "Lapis Niger." This stone differs from ordinary Roman silicium, and comes from Cape Tenarium, in Greece, thus proving that communication existed between Rome and Greece in the most remote period. For many centuries, till the fall of the Roman empire, the tomb of Romulus was considered a sacred shrine by the Romans. The discovery is incalculably valuable to historians and archæologists, proving the fact, often doubted and ridiculed, especially by the German school, that a black stone, surrounded by a marble inclosure one meter high, was missing from the E. side of the Rostra Julia.

Rona, an island with a lighthouse in the Inner Hebrides, between Skye and the mainland of Scotland, $4\frac{3}{4}$ miles long, 1 broad. It is extremely barren and of unattractive aspect. Also the name of a small island

Ronsard

with remains of an ancient oratory, 44 miles N. E. of the Butt of Lewis.

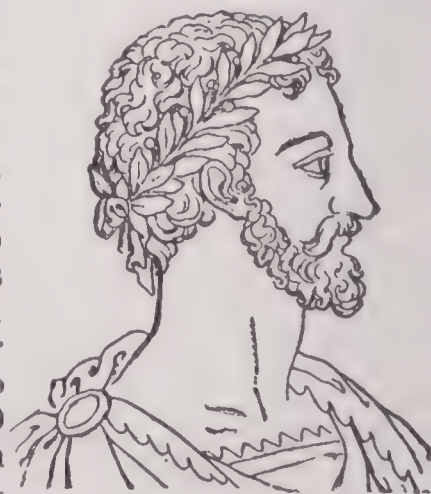
Rondeletia, in botany, a large genus of *Hedyotidæ*. Shrubs with white, yellow, blue, pink, roseate, or scarlet flowers; mostly from the hotter parts of America. The bark of *R. febrifuga* is given at Sierra Leone in fevers. In perfumery, a perfume, named from *R. odorata*, found in Mexico and Cuba, but not really prepared from that plant.

Rondeau, or **Rondo**, a kind of poetry which returns, as it were, to the same point, or in which part is repeated, thus containing a refrain. In French poetry, the rondeau is a little composition of 13 verses, divided into three unequal strophes, with two rhymes (five lines masculine and five feminine, or *vice versa*). The first two or three words of the first verse serve as the burden, and recur in that shape after the 8th and 13th verses. There are also double rondeaux and single rondeaux; the latter an obsolete but easier kind of verse. In music, a light form of composition, in which the subject or theme returns frequently; it usually forms the last movement of a symphony or sonata.

Rondelet, Antonin François, a French economist; born in Lyons, Feb. 28, 1823. His professor in philosophy, the Abbé Noirot, exerted upon him a most important religious and philosophic influence, one so profound as to be felt in all his writings. He wrote: "Critical Exposition of the Ethics of Aristotle" (1847); "Spiritualism in Political Economy" (1859); "Memoirs of a Man of the World" (1861); "The Science of Faith" (1867); "Reflections upon Literature and Philosophy, Morals and Religion" (1881); "The Book of Old Age" (1888); "An Unfortunate Woman" (1890); and many others. He died Jan. 24, 1893.

Ronger, Fiorimond. See HERVÉ.

Ronsard, Pierre de, a French poet; born in Vendomois, France, Sept. 11, 1524. At the age of 12 he became page to the Duc d'Orleans; and in 1537 he accompanied James V. of Scotland and his bride, Madeleine of France, back to their kingdom. He also spent six months at the English court, and after his return to France in 1540 was employed in a diplomatic capacity in Germany, Piedmont, Flanders, and Scotland. He was compelled however, by deafness to abandon the diplo-



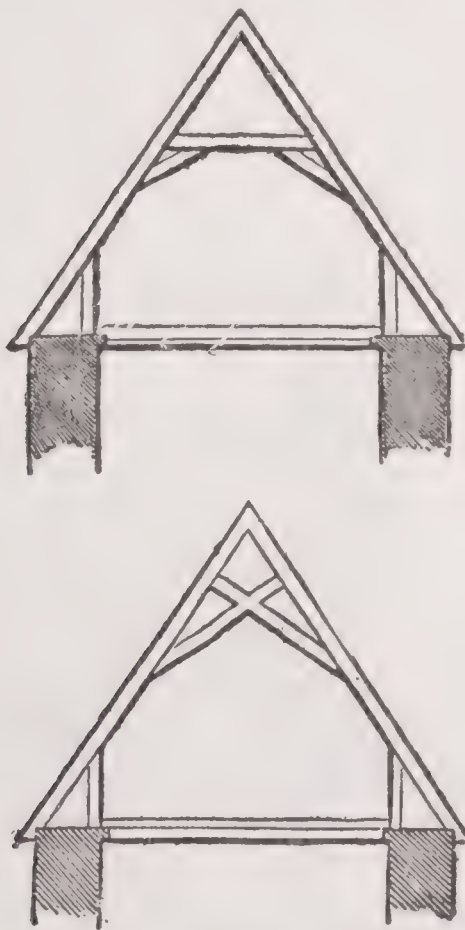
PIERRE DE RONSARD.

Ronsin

matic career; and he devoted himself to literary studies and became the chief of the band of seven poets afterward known as the "Pléiade." Ronsard's popularity and prosperity during his life were very great. Henry II., Francis II., and Charles IX. esteemed him, and the last bestowed several abbacies and priories on the poet. His writings, consisting of sonnets, odes, hymns, eclogues, elegies, satires, and a fragment of an epic poem, "La Franciade," were read with enthusiastic admiration. Ronsard combines magnificent language and imagery with a delicate sense of harmony. He died in Touraine, Dec. 27, 1585.

Ronsin, Charles Philippe, a French dramatist; born in Soissons, France, in 1750 or 1752. He wrote six tragedies and two comedies: "The League of Fanatics and Tyrants" (1791) and "Arétophile" (1793) were played in Paris with most brilliant success. He was guillotined in Paris, March 24, 1794.

Rood, a cross or crucifix; specifically, a representation of the crucified Saviour, or, more generally, of the Trinity, placed in Catholic churches over the altar screen, hence termed the rood screen. The rood consisted of the three persons of the Trinity, the Son being represented as crucified. Generally figures of the Virgin and St. John were placed at a slight distance on each side of the principal group, in reference to John xxix: 26. See Rod.

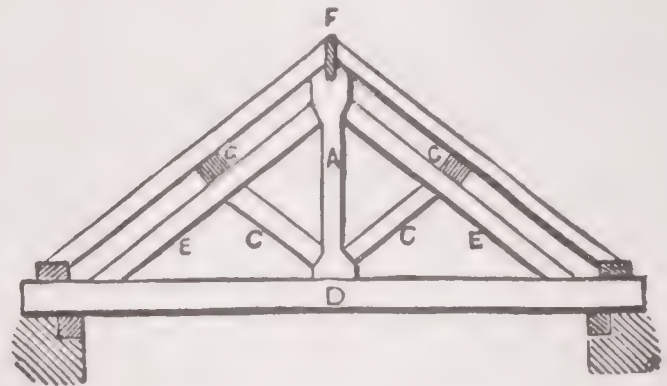


EARLY GOTHIC ROOFS.

Roof, the external covering on the top of a building; sometimes of stone, but usually of wood overlaid with slates, tiles, lead, etc. The form and construction of

Rook

the timber work of roofs differ materially according to the nature of the building on which it is to be placed, and any attempt to notice all the varieties would far exceed the limits of this work. The main parts of the framing, which in most cases are placed at regular intervals, are each called a truss, principal, or pair of principals;



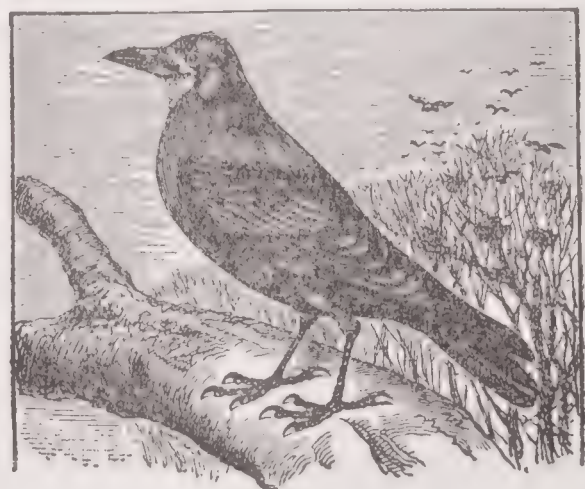
KING POST ROOF.

C C = braces. D D = tie beams. E E = principal rafters. F F = ridge pieces. G G = purline.

these, in ornamented open roofs, are the leading features, and in some ancient roofs are contrived with an especial view to appearance. A king-post roof has one vertical post in each truss, a queen-post roof has two. Since the introduction of iron in the construction of roofs, spaces of almost any width can be roofed over. Also that which resembles, or corresponds with, the cover of a building; as, the roof of the mouth, the roof of the firmament, etc.

Roof of the World, the Pamirs; an extensive table-land of Central Asia, so named by its natives. A part of the plateau is said to be 16,000 feet above the sea.

Rook, a European species of crow (*Corvus frugilegus*, Linn.), resembling in size and color the carrion crow, but differ-



ROOK.

ing in having the base of the bill whitish and scurfy, and bare of feathers. The rook is gregarious at all seasons, resorting constantly to the same trees every spring to breed, when the nests may be seen crowded one over another upon the upper branches.

Rooke

After their young have taken wing, they all forsake their nest trees, returning to them again in October to roost; but as winter comes on, they generally select more sheltered places at night in some neighboring woods, to which they fly off together. Also a cheat; a trickster; a rapacious fellow; also, one who acts as decoy-duck to gaming houses.

Rooke, Sir George, an English admiral; born near Canterbury, England, in 1650. He entered the navy at an early age and rose to be vice-admiral in 1692. For his gallantry in a night attack on the French fleet off Cape La Hogue he was knighted in 1692. His further services include the command of the expedition against Cadiz in 1702, the destruction of the French and Spanish fleets in Vigo Bay (1702), and a share in the capture of Gibraltar in July, 1704. In the following August he fought a French fleet of much superior force, under the Comte de Toulouse, off Malaga. The result was undecisive, and this fact was used against Rooke by his political opponents. Sir George quitted the service in disgust in 1705. He served in several Parliaments as member for Portsmouth. He died near Canterbury, Jan. 24, 1709.

Rookwood Pottery, The, a ceramic establishment founded in Cincinnati in 1880 by Mrs. Maria Longworth Storer, whose father, Joseph Longworth, was the founder of the art school and a chief patron of the art museum in the same city. The artistic impulse which inspired the venture came from the ceramic display of Japan at the Centennial Exhibition of 1876, and the production still bears the impress of that influence. For a time a school for pottery painting formed part of the scheme, and from the beginning the commercial side of the enterprise has been subordinate to the artistic. The ware is a true faience, made of clays from neighboring deposits in the Ohio valley, while the decorators, with the exception of one native Japanese, and including the founder herself, are graduates from the local art school. The artists are encouraged to give to each piece an individual character, and as no printing process is in use, duplications are seldom even attempted. The production divides itself into three classes: Cameo, or shell-tinted ware, used for the table; Dull Finish, whose surface, while soft in texture and easily cleaned, has the appearance of being unglazed; and, lastly, the most distinctive class of richly glazed ornamental work. The distinguishing mark of Rookwood faience in all these vases is the decorative quality of the color grounds, carefully studied with reference to harmony.

Roon (rōn), Albrecht Theodor von, a Prussian war minister; born in Pleushagen, Prussia, April 30, 1803. He entered the

Roosevelt

army at the age of 18, and speedily developed a high talent for the theoretical and educational branches of his profession, was military lecturer at Berlin, and published several books on military geography and similar subjects. Captain in 1836, major in 1842, colonel in 1851, he was appointed war minister in 1859, minister of marine in 1861, and instituted many reforms. In 1866 he was made general of infantry, and was present with the army in Bohemia during the Seven Weeks' war against Austria. It was chiefly due to his efforts that the North German army was in so perfect a state of readiness and able to be so rapidly mobilized on the outbreak of war with France in 1870. On the conclusion of the war Von Roon was made a count, and on Jan. 1, 1873, he became a field-marshal and minister-president of Prussia. In November of the same year, however, he laid down his public offices and retired to his estate in Silesia, where he chiefly resided till his death. He died in Berlin, Feb. 13, 1879.

Roosevelt, Robert Barnwell, an American lawyer; born in New York city, Aug. 7, 1829. He was an enthusiastic sportsman, and published: "The Game Fish of North America" (1860); "The Game Birds of the North" (1866); "Superior Fishing" (1866); "Florida and the Game Water Birds" (1868); "Five Acres Too Much" (1869), a satire provoked by Edmund Morris's "Ten Acres Enough"; and "Progressive Petticoats," a humorous satire on female physicians. He died June 14, 1906.

Roosevelt, Theodore, an American statesman and 26th President of the United States; born in New York city, Oct. 27,



THEODORE ROOSEVELT.

1858; was graduated at Harvard University in 1880 and began the study of law. The next year he was elected to the Assembly from the 21st District of New York, serving in the Legislatures of 1882,

1883, and 1884. While chairman of the committee on cities, he introduced reform legislation that has proved beneficial to the people of New York. In 1886 he was the Republican candidate for mayor of New York city against Abram S. Hewitt (elected), Democrat, and Henry George, United Labor candidate. In 1889 Roosevelt was appointed a member of the United States Civil Service Commission by President Harrison, and in that position he was retained by President Cleveland. In 1895 he resigned to become president of the New York municipal police board. He found police affairs in a demoralized condition, but soon corrected many evils.

Roosevelt was called by President McKinley, in 1897, to be assistant secretary of the navy. His energy and mastery of detail were shown in the preparation of the navy for the war with Spain. At the outbreak of the war he assisted in recruiting the 1st United States Volunteer Cavalry (the "Rough Riders"), of which he became lieutenant-colonel and afterward colonel, being promoted for gallantry in the action at Las Guasimas, Cuba.

After the war Roosevelt returned to private life, but soon entered upon a new political career. In 1898 he was nominated by the Republicans for governor of New York, and was elected. His administration undertook important reforms, to complete which he desired a second term, but in 1900, against his wish, he was nominated for vice-president on the Republican ticket headed by William McKinley, and was elected in November. On the death of President McKinley, Sept. 14, 1901, Roosevelt succeeded to the presidency, announcing that his policy would be a continuation of his predecessor's. By his appointment of a commission to arbitrate the coal strike of 1902, the President relieved a grave industrial situation. During this administration McKinley's treatment of the Filipinos was followed out, and they were granted a certain measure of autonomy; reciprocity negotiations with other powers were conducted; increase in naval strength was made; a department of Commerce and Labor was established; the Pacific cable was laid and the construction of the Panama Canal was authorized.

In 1904 President Roosevelt was re-elected. His message to Congress in December dealt with many questions, particularly with those pertaining to corporations and to capital and labor. In 1906 the President received the Nobel prize for his action leading to the termination of the Russo-Japanese War (*q.v.*). In the same year he influenced Congress to legislate against unfair railway rate discrimination. His success in obtaining the Pure Food Law speedily produced good results. Other leading events of his second administration were the

prosecution of various trusts—if not finally effectual, at least not without result in the curbing of lawbreaking corporations; the dismissal of negro soldiers in consequence of the alleged participation of some of them in a murderous riot at Brownsville, Tex. (August, 1906), controversy concerning which continued throughout the remainder of Roosevelt's presidency; the President's action in 1906-07 and in 1909 to prevent anti-Japanese demonstrations on the Pacific coast from precipitating international strife; the appointment of an inland waterways commission (March, 1907); the action of the Treasury Department in issuing bonds and certificates of indebtedness to aid relief measures during the banking panic of 1907-08; the Pacific cruise of the United States warships (1907-09); the conference of State governors and others, at the White House (May, 1908), regarding the conservation of natural resources, followed (June) by the appointment of a national commission to serve that end. The President's peremptory refusal to consider another nomination, though strongly urged to seek it, is worthy of record. These items only indicate a few of Roosevelt's multifarious official and personal activities during his second term. His numerous messages and speeches are equally to be noted, if less important than his chief official acts. Alike by speech and act he both won approval and aroused antagonism. He was frequently in violent conflict with individuals and organizations, and had serious difficulties with Congress, the latter part of his second term being especially disturbed by such contentions. Regarding the more important of these controversies, as well as many other features of the Roosevelt administrations, contemporary opinion, much at variance, must defer to the future judgments of history. Before taking leave of the White House, President Roosevelt, long known as an expert hunter, made preparations for "a scientific expedition to Africa outfitted by the Smithsonian Institution, and starting from New York city" (March, 1909), to "gather natural history materials for the government collections."

He spent nearly nine months hunting in Africa and about six months visiting the royalties and principal capitals and large cities of Europe, and returned to New York on June 18, 1910. While in Europe he lectured at Paris, Christiania, Berlin, London, and Oxford University; represented the United States at the funeral of King Edward VII.; made a speech in the Guildhall, London, on the Egyptian situation, which caused a widespread sensation; and with Emperor William reviewed a large body of German troops. After his return he became temporary chairman of the New York State Republican Convention, defeating Vice-President Sherman for the place, and made an extended

Root

lecturing tour, announcing a doctrine of "New Nationalism."

Roosevelt's writings include: "The Naval War of 1812" (1882); "Life of Thomas Hart Benton" (1887); "Life of Gouverneur Morris" (1888); "Ranch Life and Hunting Trail" (1888); "The Winning of the West" (1889-96); "History of New York City" (1891); "The Wilderness Hunter" (1892); "American Ideals" (1897); "The Rough Riders" (1899); "Life of Oliver Cromwell" (1900); "The Strenuous Life" (1900); "The Deer Family" (1902, in collaboration with others); "Outdoor Pastimes of an American Hunter" (1905); and other works. See REPUBLICAN PARTY.

Root, in botany, the radix or descending axis of a plant. The body of a root is called the caudex, its minute subdivisions the fibrils or radicles, and their ends the spongioles. A primary root is one formed by the downward elongation of the axis of the embryo; secondary or lateral roots, spring laterally from the stem and from the primary root. When the primary root is thicker than the branches, it is called a tap root; when it is no thicker, the root is said to be fibrous. The chief functions of roots are to anchor plants in the ground, and to transmit nutriment from the soil.

Root, Elihu, an American statesman; born in Clinton, N. Y., Feb. 15, 1845; was graduated from Hamilton College in 1864, and from the New York University Law School in 1867; was admitted to the bar, and soon attained prominence in his profession, acting for individuals and great corporations in famous cases, notably as counsel for William M. Tweed, for Judge Hilton in the Stewart will case, for the Sugar Trust, etc. In 1883-85 he was United States district-attorney for the Southern District of New York. In 1899 he was appointed secretary of war by President McKinley. After the Spanish-American War, he did important constructive work in Porto Rico, Cuba, and the Philippines, and in army reorganization. He resigned in 1904, and the following year succeeded John Hay as secretary of state. He participated in the Pan-American Congress (*q. v.*) in 1906, and visited several South American countries, bearing friendly assurances on the part of the United States. In January, 1907, he carried similar messages of good will to Canada, and in October to Mexico. Besides these acts of amity, he procured many treaties ending international differences. In January, 1909, with Ambassador Bryce he signed a treaty for settling disputes between the United States and Canada, and was elected a United States Senator from New York; and in 1910 was special counsel for the United States before The Hague Tribunal.

Root, George Frederick, an American musician and song-writer; born in Sheffield,

Rope

Mass., Aug. 30, 1820. His first song, "Hazel Dell" (1853), was very popular. It appeared as the work of "Wurzel," the German name for "Root," a pseudonym he often used later. Among the most popular of his songs are: "Rosalie, the Prairie Flower" (1855); "Shouting the Battle Cry of Freedom" (1861); "Just Before the Battle, Mother" (1863); "Tramp, Tramp, Tramp, the Boys are Marching" (1864); and the well-known quartet, "There's Music in the Air." His cantatas include "The Flower Queen" (1852) and "The Haymakers" (1857). He did much to elevate the standard of music in the United States, and also published methods for the piano and organ, handbooks on harmony and teaching, etc. He died Aug. 6, 1895.

Root and Branch Men, a party in the British House of Commons and out of it who supported a petition signed by 15,000 London citizens, praying that episcopacy might be destroyed "root and branch." Nathaniel Fiennes, Sir Harry Vane, and Hampden were of the party. A bill to give effect to the petition was read a first and second time in 1641, but was ultimately dropped.

Rope, a large, stout, twisted cord of hemp, of not less, generally, than an inch in circumference. A certain proportion of hemp twisted together forms a yarn, and a number of yarns form a strand. Three strands twisted together form a rope. Rope is either white or tarred, the latter being the best if liable to exposure to wet, the former if not exposed. The strength of tarred rope is, however, only about three-fourths that of white rope, and its loss of strength increases with time. Rope is designated by its circumference, expressed in inches, and is issued in coils of 113 fathoms each; marline and hambroline in skeins, spun-yarn in pounds; the latter is made from old rope (junk). In the British service government rope is marked by a thread, red, blue, or yellow, which runs through it, and rope used in the artillery is coiled with the sun, *i. e.*, from left to right, in which direction the yarns are twisted so as to avoid kinking. The strength of white hempen rope may be approximately calculated by the following rule, viz., square the circumference, and divide by five for the number of tons dead-weight that the rope will bear. The strain, however, caused by a sharp jerk on a rope is very much greater than that of a dead-weight. It is stated, in this respect, that the strain on a rope loaded with a weight of 200 pounds, and suddenly checked after a fall of 8 feet, is nearly equal to that which is caused by a dead-weight of two tons. Other materials besides hemp are used in the manufacture of rope, but to a smaller extent. Coir rope, which comes from Ceylon and the Maldive

Rope-making

Islands, is made from the fibrous husk of the cocoanut. Manila rope from the fibers of a species of wild banana. Wire rope, both iron and steel, is also employed; on ship-board, particularly, to a considerable extent.

Rope-making. There is nothing more prosaic or that enters into a greater number of homely employments than a rope, and yet those complicated instruments for the extension of man's power, the abridgment of time, and saving of labor—the printing press, the steam engine, the electric telegraph, the sewing machine—in the march of invention all precede the rope-making machine. So long, indeed, did rope-making remain one of the manual arts that the name of the place wherein it was for ages carried on has become ingrained in popular speech, and the rope factory, though in no way meriting the appellation, is still called the “rope-walk.”

The slow and toilsome primitive methods were everywhere employed in rope-making as late as about 1862, while some steps of the process—such as “hackling,” or the preparation of the fiber, and “laying,” or the twisting of the rope—have been generally accomplished by machinery only since about 1872.

It has happened in one or two notable instances that peculiar forms given to certain things and firmly established by long usage have acted as insurmountable obstacles to invention in particular directions for years after great strides had been made in closely allied industries. The antiquated contrivance for “laying” was a barrier which long interfered with progress in rope-making. Like the needle, it held the thread at the wrong end. By it the twist was put on the strands which enter into the rope, while the chief operator or “layer” held the rope in his hands and wound it around his body as it was twisted. Two cast-iron conditions were consequently imposed on the industry. It could be carried on only in long walks or great space, and the length of the rope was precisely limited by the length of the walk. In the revised edition of the “American Cyclopaedia,” published not longer ago than 1881, it is stated as a fact worthy of note that the government rope-walk at Boston could turn out a rope 170 fathoms (1,020 feet) long.

A young workman in a rope-walk saw that the twist should be applied to the rope instead of the strands, if machinery was to take the place of the hand in rope-making, and realized fame and fortune from the conception. But these did not follow immediately. In this, as in other cases, the idea had to await the opportunity for its practical expression.

The young workman referred to was John Good, afterward the leading manufacturer of rope-making machinery in the United States, if not in the world. Mr.

Rope-making

Good's opportunity came with the proposition to grapple for the broken ends of the Atlantic submarine cable. A rope fully 2,000 fathoms, 12,000 feet, long was required for the grappling, but no rope even 200 fathoms long had ever been made in one piece, and the task of making one of this unheard-of length could not be undertaken seriously by any ropemaker then in the business.

At that juncture young Good came forward with a proposition to build machinery from his own designs and make the rope in one piece as long as was wanted. The offer was a bold one, but the persons he had to deal with were practical and progressive men, and they saw at once that he was also a practical and progressive man. Consequently the offer was accepted, the machinery built, the rope made, the break in the cable found and repaired, and telegraphic communication between the Old World and the New, which, after the sending of one brief message, had been interrupted for years, was reestablished on a secure and permanent basis.

At the same time Mr. Good effected a revolution in rope-making, though nearly 20 years elapsed before his inventions forced their way into general use. The essential principle of his “laying” machine was a spindle, which had a rapid lateral revolution to give the twist to the rope, and a slow horizontal revolution to wind up the rope as it was twisted. It is worthy of remark, however, that his latest machine embodies a return to first principles, in that the frame which holds the strand-bobbins is made to revolve, and so twist the strands as in the antiquated hand method. This machine possesses the advantage over the earlier one of saving the labor of one step of the process. The rope can be spooled or coiled in lengths to suit customers as fast as it is twisted.

Rope is made at the present time chiefly from sisal and Manila hemp. The former, which is the whiter and cheaper fiber, comes chiefly from Yucatan; the latter from the Philippine Islands, and is called from the chief port of shipment. After the breaking of the bales, the first step in the process is the oiling of the fiber. This is done by placing it layer on layer and sprinkling each layer with oil from a watering pot. The oiling is necessary to make the fiber run evenly and easily through the preparatory machines, as well as to give the rope a good appearance. Kerosene oil is used, as it does not heat the fiber. Animal oil would produce spontaneous combustion in a single night.

From the oiling room the fiber is carried on flat trucks to the spreaders. These are three separate machines called, respectively, the spreader, fine spreader, and extra-fine spreader. They are similar in character, but,

as their designations imply, each effects a refinement of the process begun by the other. At the spreader the fiber is placed in a long, narrow trough, whence it is fed by rollers upon a belt bristling with transverse rows of long, pointed iron teeth, the teeth being about two inches and the rows eight inches apart. At the end of this belt, which is about 10 feet long, the fiber is fed by another set of rollers to a second belt, armed like the first with teeth, but smaller and nearer together, both as to the individual teeth and the rows. It is scarcely necessary to say that these toothed belts comb or card the fiber and take the place of the old hackling process. The two belts travel at different velocities, that of the second being 12 times greater than that of the first. From the second belt the fiber is carried by feed-rollers into a receptacle, or hamper, by which it is transferred to the fine spreader. This, as well as the extra-fine spreader, is so nearly like the spreader as not to need a description.

The drawing machines receive the fiber after it has passed through the last spreader. These are two in number, and their relation to each other is analogous to that of the spreaders. Two or more webs from the spreaders, according to the ultimate purposes for which they are designed, are brought together for passage through the first drawing machine. They are fed along a trough into a funnel-shaped opening, whence they travel onward between a set of rollers to be thrown once more into hampers for transference to the second drawing machine. This repeats the process of the first, but carries it a step further, and then the fiber is ready for the spindles.

The spindles are an adaptation of the ordinary spinning jenny to suit the coarser fiber employed. These, of course, make the yarn, which is next worked up into strands by the forming machine. The bobbins from the spindles are set in a frame, and the threads, the number being determined by the size of the rope to be made, are brought together through converging holes in a block and attached to a bobbin, which twists the strand and winds it as fast as twisted. Precisely the same process is repeated by the laying machine, though on a larger scale. After it comes from the laying machine, the rope is wound into coils of convenient size for handling, weighed, and sewed in burlap for shipment.

The manufacture of binder twine was also created by Mr. Good. Its importance today may be gauged by the fact that \$12,000,000 worth of it was made and sold in the United States in a single year. When McCormick first brought out his reaping machine, it was made to bind the sheaves with fine wire. The device was neat as well as economical of labor, but it produced unexpected and disastrous results. Myste-

rious fires destroyed flour mill after flour mill. Investigation eventually discovered the fact that the fires were caused by fragments of the wire getting into the millstones with the wheat. Then an ingenious Yankee stepped into the breach with a magnet for taking the fragments of wire from the wheat, restored tranquillity among the millers, and made a large fortune for himself.

But meanwhile a strange and uniformly fatal disease had broken out among the cattle and horses, and spread all over the country. After a while post-mortem examinations on an extended scale disclosed the secret of the disease. It was minute fragments of wire swallowed by the animals in their fodder. Mr. Good supplanted wire with binder twine, which is merely a loosely-spun yarn made of coarse fiber. He devised and patented a spindle expressly for making it, and he simplified and improved this so that it is among the possibilities of the near future that every farmer may make his own binder twine.

Ropes, John Codman, an American historian; born in St. Petersburg, Russia, April 28, 1836; was graduated at Harvard in 1857; studied at the Harvard law school, and was admitted to the bar in 1861. Largely through his influence the United States government began the collection and preservation of information relating to the Civil War, and he organized the Military Historical Society of Massachusetts. Besides contributions to this society and to periodicals, he wrote: "The Army under Pope" (1881); "The First Napoleon" (1885); "The Campaign of Waterloo"; "Atlas of Waterloo"; and "The Story of the Civil War." He died in Boston, Mass., Oct. 28, 1899.

Roqueplan, Louis Victor Nestor, a French littérateur; born in Mallemort, Bouches-du-Rhône, France, in 1804. He gained a reputation at the end of the Restoration by his contributions to literary journals, principally "Figaro." He published a number of clever books, among them being: "News at Hand"; "Renewal of Parisian Life" (1853); and "The Green-Rooms of the Opera" (1855). He died in Paris, April 24, 1870.

Roquette, Adrien Emmanuel, an American poet; born in New Orleans, La., Feb. 13, 1813. He was chaplain to the Roman Catholic Seminary at New Orleans, and was known as the Abbé Roquette. His principal works include: "Les Savannes: American Poems" (1841), in which the "Souvenir of Kentucky" is best known; "Wild Flowers: Sacred Poetry" (1848); "Deep Solitude in America" (1852); "L'Antoniade; or, Solitude with God" (1860); "Patriotic Poems" (1860); and "Catherine Tehgahkwita" (1873). He wrote

with equal ease and grace in English and French. He died in New Orleans, July 15, 1887.

Roquette, Otto, a German poet; born in Krotoschin, Posen, April 19, 1824. An instructor for many years in Dresden and Berlin, he renounced this career and turned to the exclusive study of literature. He soon acquired a great reputation in his native land by his graceful poems, notably "Waldermeister's Bridal Tour" (1851). He published: a "Song Book" (1852); "History of German Literature" (1862-1863); "Dramatic Poems" (1867-1876); "Waldermeister's Silver Wedding" (1876); and others. Also a number of dramatic poems, including: "The Enemy at Home"; "The Serpent"; and "The Garden of Roses" (1876). He died in Darmstadt in April, 1896.

Roraima, a celebrated mountain in South America, where the boundaries of British Guiana, Venezuela, and Brazil meet, 7,800 feet high, flat-topped, with steep, rocky sides, rendering the summit almost inaccessible. E. im Thurn was the first to reach its top in 1884.

Roric Figures, figures visible only in vapor made on plates of metal, glass, etc. Thus a cone resting for a little on a plate of smooth metal will leave behind it a copy, which will become visible if it be breathed upon. The phenomenon may be produced by the action of electricity.

Rorqual, the name given to certain whales, closely allied to the common or whalebone whales, but distinguished by hav-



NORTHERN RORQUAL.

ing a dorsal fin, with the throat and under parts wrinkled with deep longitudinal folds, which are supposed to be susceptible of great dilatations, but the use of which is as yet unknown. Two or three species are known, but they are rather avoided on account of their ferocity, the shortness and coarseness of their baleen or whalebone, and the small quantity of oil they produce. The N. rorqual (*Balænoptera boops*) attains a great size, being found from 80 to over 100 feet in length, and is thus the largest living animal known. The rorqual feeds on cod, herring, pilchards, and other fish, in pursu-

ing which it is not seldom stranded on the shore.

Rosa, Carl August Nicholas, originally ROSE, a German opera manager and violinist; born in Hamburg, Germany, March 22, 1842. He was educated at the Leipsic Conservatory for a violinist, and appeared at the Crystal Palace in London, March 10, 1866. He soon came to the United States, where during a concert tour he met and married (in New York, in February, 1867) Mme. Parepa; formed an opera company, including Mme. Parepa-Rosa, Wachtel, Santley, Ronconi, and Formes, traveling as far as California. After his wife's death (1874), he organized in London an English opera company with which he produced nearly a score of popular operas not previously given in English. He died in Paris, France, April 30, 1889. See PAREPA-ROSA.

Rosa, Monte, a mountain or group of the Pennine Alps, on the frontiers of the Swiss canton of Valais and Piedmont, and forming part of the watershed between the Rhone and the Po. Next to Mont Blanc it is the highest mountain in the Alps, but as a group it is much more massive than the Mont Blanc group. It has eight summits above 14,000 feet, the highest being Dufourspitze (15,217), ascended for the first time in 1855. Of the huge glaciers that occupy the slopes of this mountain the chief are the Gôrner Glacier on the W., the Schwarzberg and Findelen Glaciers on the N., the Sesia and Macugnaga Glaciers on the E., and the Lys Glacier on the S.

Rosa Gonzales, Juan de la, a Spanish dramatist; born in Valladolid, Spain, in 1820. His articles in criticism placed him among the first of Spanish contemporary literary critics. He also wrote lyric poetry, and a number of successful dramas, notably "At the Cock's Mass"; "With and Without Reason"; "The Counsels of Thomas"; "The Son of the People"; "The Spanish Adventurer"; and "Jealousy of a Noble Soul."

Rosa, Salvator, an Italian painter, etcher and poet; born near Naples, Italy, June 20, 1615. He received instruction in art from his brother-in-law, Francesco Fracanzaro, a pupil of Ribera, but his taste and skill were more influenced by his studies of nature on the Neapolitan coast. Rosa's father, dying in 1632, left his family in difficulties, and Salvator was compelled to sell his landscapes for small sums. One of his pictures fell into the hands of the painter Lanfranco, who at once recognized the genius of the youth and encouraged him to go to Rome. In 1638 Rosa settled in Rome, where he soon established his reputation and rose to fame and wealth. The bitterness of his satire, expressed both in his satirical poems and in an allegorical painting of the "Wheel of Fortune" ren-

Rosacea

dered his stay in Rome inadvisable. He therefore accepted an invitation to Florence (1642), where he remained nearly nine years under the protection of the Medici. He finally returned to Rome. Salvator Rosa delighted in romantic landscape, de-



SALVATOR ROSA.

lineating scenes of gloomy grandeur and bold magnificence. He also painted battle scenes, and latterly historical pictures. His poems were all satires, vigorous enough and pungent; among them are "Babylon"



GAMING SOLDIERS, BY ROSA.

(i. e., Rome), "Music," "Poetry," "Painting," "War," and "Envy." Rosa etched from his own works with great skill. He died in Rome, Italy, March 15, 1673.

Rosacea, Acne Rosacea, or Gutta Rosea, an affection which appears on the

Rosamond

face, especially the nose, forehead, cheeks, and skin, characterized by an intense reddening of the skin without swelling. Persons who indulge in alcohol to excess are liable to it. Regular habits, and plain and temperate living, both prevent and cure.

Rosaceæ, roseworts; an order of plants placed by Lindley under his Rosal Alliance. Calyx four or five-lobed, free or adhering to the ovary; petals five, perigynous, equal; stamens indefinite, rising from the calyx just within the petals, curving inward in æstivation; ovaries several or only one; ovules two or more, generally suspended; fruit either one-seeded nuts or acini, or several-seeded follicles; the leaves are simple or compound, generally with two stip-



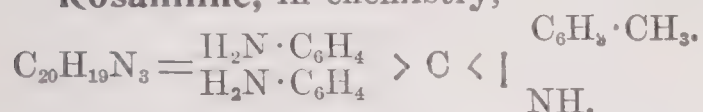
ROSA RUGOSA.

ules. Herbaceous plants or shrubs. The *rosaceæ* are closely akin to the *pomaceæ*, the *drupaceæ*, the *sanguisorbeæ*, and some other orders. They are divided by Lindley into five families or tribes, *rosidæ*, *potentillidæ*, *spiræidæ*, *quillaïæ*, and *neuradææ*. The *rosaceæ* occur chiefly in the temperate and cold parts of the Northern Hemisphere; when they occur in the tropics it is generally on high land. There is no unwholesome plant in the order. They are in general astringent, and have been regarded as febrifuges. In 1846 Lindley enumerated 38 genera and estimated the known species at 500. Sir Joseph Hooker, in 1870, considered the genera to be 71 and the species 1,000, but he includes Lindley's *pomaceæ* and *drupaceæ*.

Rosamond, commonly called FAIR ROSAMOND, the mistress of Henry II. of England. She was the daughter of Walter de Clifford, a knight of property in various shires. Almost everything else related to Rosamond is legendary. The fable of the dagger and poison with which the jealous Queen Eleanor is said to have sought out her rival has not been traced higher than a ballad of 1611. She died in 1176 or 1177,

soon after her connection with the king was openly avowed, and was buried in the Church of Godstow Nunnery, whence, however, Hugh of Lincoln caused her body to be removed in 1191.

Rosaniline, in chemistry,



a red dye, occurring in commerce under the names of aniline red, azaleine, fuchsine, magenta, roseine, etc. It is prepared by heating a mixture of dry arsenic acid and aniline to 140°, for six or eight hours. It forms colorless crystalline plates, which are colored red on exposure to the air, insoluble in water, but soluble in alcohol. The aniline reds used in dyeing are generally monoacid salts of rosaniline more or less pure. Rosaniline acetate, $\text{C}_{20}\text{H}_{19}\text{N}_3 \cdot \text{C}_2\text{H}_4\text{O}_2$, forms beautiful large crystals, which are more soluble in water than the other salts. Rosaniline hydrochloride, $\text{C}_{20}\text{H}_{19}\text{N}_3 \cdot \text{HCl}$, prepared in France and Germany, crystallizes in golden-green rhombic octahedra, and is very soluble in alcohol, with a fine red color.

Rosario, the third city of the Argentine Republic, and the largest in Santa Fé; on the W. bank of the Parana, 190 miles N. W. of Buenos Ayres. It has an excellent harbor, and carries on a large commerce direct with Europe; the exports exceed \$18,750,000 and the imports \$22,500,000. The houses for the most part are of a single story; for the rest, the city is laid out, on a smaller scale, on the lines of Buenos Ayres, with narrow streets, ill paved, few and paltry plazas, and only one monument of note—a lofty marble shaft (1883) bearing a figure of Victory and surrounded by four statues. Tramways run in every direction, and there is a telephone to Buenos Ayres. The city possesses an exchange, a theater, a great bull-ring, two markets, hospitals, steam elevators, a sugar factory, etc. Rosario was founded in 1725. Pop. (1906) 135,000.

Rosary, in ordinary language, a chaplet, a garland. Also, a bed of roses; a place where roses grow; or a coin so called from bearing the figure of a rose, of foreign coinage, about the size of a penny, but worth less than a halfpenny, chiefly smuggled into Ireland. In 1300 it was made death to import them. In comparative religion, a string of beads by means of which account is kept of the number of prayers uttered. Tylor thinks that its invention or adoption was due to the fact that, with advancing civilization, prayers, from being at first utterances as free and flexible as requests to a living patriarch or chief, stiffened into traditional formulas whose repetition required verbal accuracy, and whose

nature practically assimilated more or less to that of charms.

In the Roman Catholic Church: (1) A form of prayer in which the "Hail Mary" is recited 150 times in honor of the Virgin Mary. It is divided into 15 decades, each of which begins with the "Our Father" (see LORD'S PRAYER), is accompanied by meditation on one of the mysteries in the life of our Lord, and ends with the doxology. This is properly called the Dominican, or Great Rosary, but the name is often popularly given to the Chaplet, which contains but 50 aves. The 15 Mysteries which should be meditated on during the recitation of the Rosary are divided into three series, each corresponding to a chaplet:

1. Joyful.—The Annunciation, the Visitation, the Birth of Jesus, the Presentation in the Temple, the Finding in the Temple.
2. Sorrowful.—The Agony in the Garden, the Scourging at the Pillar, the Crowning with Thorns, the Carrying of the Cross, the Crucifixion.
3. Glorious.—The Resurrection, the Ascension, the Descent of the Holy Ghost, the Assumption, and the Coronation of the B. V. M.

There are also the Rosaries of St. Bridget, of the Seven Dolors, of the Immaculate Conception, of the Five Wounds, and the Crown of Our Saviour. (2) The beads on which any of the foregoing forms of prayers are said.

Rosary Sunday, the first Sunday in October; a feast instituted by Gregory XIII. for the Confraternity of the Rosary, and made of universal observance after the victory of the Emperor Charles VI. over the Turks, in gratitude to the Blessed Virgin. An impetus has been given to the devotion of the rosary by Leo XIII., who enjoined its daily use in public during October. Roses are blessed and distributed as souvenirs, and the rosary is recited continually during the day.

Roscius, Quintus, the most celebrated comic actor at Rome; born a slave about 134 B. C. He realized an enormous fortune by his acting, and was raised to the equestrian rank by Sulla. He enjoyed the friendship of Cicero, who in his early years received instruction from the great actor. Roscius died about 62 B. C.

Roscius, The Young. See BETTY, WILLIAM HENRY WEST.

Roscoe, Sir Henry Enfield, an English chemist; born in London, England, Jan. 7, 1833. He was educated at Liverpool High School, University College, London (B. A. 1852), and Heidelberg. On his return to England he devoted himself to science, especially chemistry. From 1857 to 1887 he was Professor of Chemistry at Owens College, Manchester; after 1885 he represented South Manchester in Parliament in the Liberal interest; was vice-chancellor of the

Roscoe

University of London from 1896. Honors of all kinds flowed in on him from the universities (LL. D. Cantab. 1883; D. C. L. Oxon. 1887) and learned societies (Royal Society's gold medal, 1873); and in November, 1884, he was knighted. His works include "Investigations on the Chemical Action of Light"; "Lessons in Elementary Chemistry"; "Lectures on Spectrum Analysis"; with Professor Schorlemmer, a "Treatise Upon Chemistry" (3 vols. 1877-1884); "Primer of Chemistry"; "Genesis of the Atomic Theory of Chemistry"; etc.

Roscoe, Thomas, an English translator and author; born in Toxteth Park, Liverpool, England, June 23, 1791. He followed literature as a profession till within a few years of his death, and produced and translated many books. His original works include: "Gonzola the Traitor: a Tragedy" (1820); "The Tourist in Switzerland and Italy" (1830), followed by six volumes of a similar character; "Legends of Venice" (1841); "Life of William the Conqueror" (1846); "The Last of the Abencerages, and Other Poems" (1850); and others. His translations comprise: "Memoirs of Benvenuto Cellini" (1822); "Italian Novelists" (1825); "German Novelists" (1826); "Spanish Novelists" (1832); and many others. He died in St. John's Wood, London, Sept. 24, 1871.

Roscoe, William, an English historian; born in Mt. Pleasant, Liverpool, England, March 8, 1753. His most important work, "The Life of Lorenzo de' Medici" (1795), did much toward stimulating English interest in Italian literature. His "The Butterfly's Ball and the Grasshopper's Feast" (1807), a nursery classic in verse, attracted the attention of the king and queen, and was set to music for the young princesses. Among his many other works may be named: "A General View of the African Slave Trade" (1788); "The Life and Pontificate of Leo the Tenth" (1805); and "On the Origin and Vicissitudes of Literature, Science, and Art" (1817). He died in Toxteth Park, Liverpool, June 30, 1831.

Rose, the beautiful and fragrant flower which has given name to the large natural order *Rosaceæ*, seems to be confined to the cooler parts of the Northern Hemisphere. The species are numerous and are extremely difficult to distinguish. They are prickly shrubs, with pinnate leaves, provided with stipules at their base; the flowers are very large and showy; the calyx contracts toward the top, where it divides into five lanceolate segments; the corolla has five petals, and the stamens are numerous; the seeds are numerous, covered with a sort of down, and are attached to the interior of the tube of the calyx, which, after flowering, takes the form of a fleshy globular or ovoid

Rosebery

berry. The rose is easily cultivated, and its varieties are almost endless.

As an illustration of the remarkable way and short time in which new varieties are formed, Darwin tells of a case where from a single wild Scotch rose, by selection and with no fresh kinds, in less than 50 years 300 varieties were produced, of many sizes and colors, white, pink, yellow, red, and variegated. Nature, almost unaided, will perform wonders in bringing forth new roses; but man, properly conversant with her secrets, can do much to help. Crossing, grafting, and bud variation are the methods practised by growers. Of these crossing is the favorite and most successful; it consists in transferring the pollen of one variety to the stigma of another. Yet the careful floriculturist may patiently carry the pollen of a fine rose to the stigma of another fine variety year after year and not obtain any improvement on the older varieties of roses. Indeed, in many cases the newly-created rose will be inferior to its parents. The American Beauty rose had its birth in an almost neglected corner of the Washington garden of the late George Bancroft. Amid a tangle of roses of common varieties suddenly blossomed this new and wonderful rose. Slips were at once experimented with. At first they were grown out of doors, but before long it was found that hothouse culture such as is given to tea roses was best suited to the splendid new rose. During the comparatively few years of its existence the American Beauty has been steadily improved in size and fragrance.

Rose, George. See SKETCHLEY ARTHUR.

Rose Acacia (*Robinia hispida*, natural order *Leguminosæ*), a highly ornamental flowering shrub inhabiting the S. parts of the Alleghany Mountains, and now frequently seen in gardens in Europe. It is a species of locust; the flowers are large, rose-colored, and inodorous; the pods are glandular-hispid.

Rose Apple, or **Malabar Plum**, a tree of the genus *Eugenia*, the *E. Jambos*, belonging to the natural order *Myrtaceæ*. It is a branching tree, a native of the East Indies. The fruit is about the size of a hen's egg, is rose-scented, and has the flavor of an apricot. Under the same name some related species are included

Rosebay, in botany, the popular name of the genus *Rhododendron*.

Rosebery, Archibald Philip Primrose, 5th Earl of, an English statesman; born May 7, 1847; was educated at Eton and Oxford, and succeeded his grandfather in 1868. He was an advanced Liberal in politics, and a ready and effective speaker. He was under-secretary at the home office, 1881-1883; lord privy seal and first commissioner of

Rose Camphor

works, 1885; next year held the secretaryship of foreign affairs till the fall of the Gladstone government; was secretary of foreign affairs again in 1892-1894; prime minister, 1894-1895. In 1878 he was elected lord-rector of Aberdeen University; in 1881 of Edinburgh University; in 1899 of Glasgow University. In 1889 he became a member of the London County Council, and was appointed chairman of that body. The University of Cambridge conferred the degree of LL. D. on him in 1888. He advocated the reform of the House of Lords, and was much interested in the questions of imperial federation and the social conditions of the masses. In 1878 he married Hannah, daughter of Baron Mayer de Rothschild; she died in 1890. When Mr. Gladstone succeeded to power Lord Rosebery became Secretary of Foreign Affairs, and in October of the same year (1892) he was made a Knight of the Garter. On the resignation of Mr. Gladstone in March, 1894, the queen offered the post of prime minister to Lord Rosebery, and he carried on the government with no little success till July, 1895. He then urged on his supporters that the general election should be fought on the question of the predominance of the House of Lords. During 1896 his attitude on the Armenian question differed from that of Mr. Gladstone, and finally he decided on resigning the leadership of the party in order to leave himself an absolutely free hand on this question. His view was that Great Britain should not be hurried into an intervention in the Armenian question, which would lead to the risk of a European war. In 1898 Lord Rosebery, from his place in the House of Peers, paid a noble and eloquent tribute to the life and public services of Mr. Gladstone, and later on spoke in the country in support of the attitude taken up by Lord Salisbury on the Fashoda situation. He became Lord Rector of Glasgow University in 1899, and President of the Liberal League in 1902.

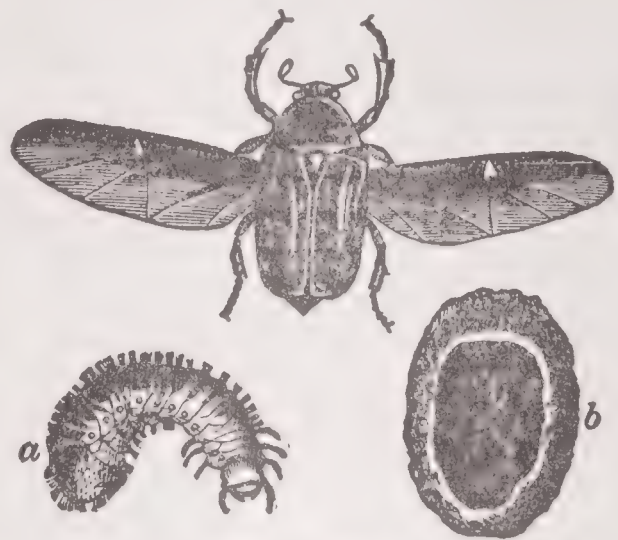
Rose Camphor, the stearoptene of rose oil. It crystallizes in laminae, melting at 35°, and boiling between 280° and 300°, is slightly soluble in alcohol, but soluble in ether and essential oils. It dissolves in potash and acetic acid, but is very slightly acted on by hydrochloric and nitric acids.

Rose Campion, a name common to several species of the genera *Agrostemma*.

Rose Chafer (*Cetonia aurata*), an injurious beetle, whose grubs destroy the roots of strawberries and other plants, while the adults spoil the flowers of roses, strawberries, and seed turnips. The eggs are laid in the ground; the full-grown grubs are whitish and about an inch and a half in length, after two or three years they pupate inside earthen cocoons. The adults, which are

Rosecrans

well able to fly from place to place, measure about an inch in length, are golden green above, coppery with a tint of rose beneath. Where they are likely to do harm the adults



ROSE CHAFER.

a, larva; b, cocoon.

and grubs should be collected and destroyed, and recourse may be had to remedies similar to those used against cockchafers. The "rose-bug" of the Eastern United States is another beetle (*Macrodactylus subspinosus*), a voracious pest which often appears in immense numbers and destroys the flowers of rosaceous plants.

Rosecrans, Sylvester Horton, an American clergyman; born in Homer, O., Feb. 5, 1827; brother of Gen. William S. Rosecrans, was graduated at Kenyon College in 1845, and at the College of the Propaganda, Rome, in 1851; was ordained a priest in 1852; and was appointed a pastor of the cathedral in Cincinnati in the same year. In 1859 he was made president of a college which in that year was opened for Roman Catholic youth. He was consecrated first bishop of Columbus, O., in 1868, and began the erection of St. Mary's Cathedral, one of the finest structures in Columbus. Later he built the seminary of St. Aloysius, and was instrumental in founding many other schools. He died in Columbus, O., Oct. 21, 1878.

Rosecrans, William Starke, an American military officer; born in Kingston, O., Sept. 6, 1819; was graduated at the United States Military Academy in 1842; entered the army as brevet 2d lieutenant of engineers, but after serving for a year at Hampton Roads returned to West Point as assistant Professor of Engineering. In 1847 he again entered active service, but resigned in 1854 to become a consulting engineer and architect in Cincinnati, O. He began his career in the Civil War by organizing and drilling the Home Guard in Ohio; and in June, 1861, was placed in charge of Camp Chase. He was made colonel of the 23d Ohio Volunteers soon afterward, and in a

Rosegger

short time was appointed a Brigadier-General. He was second in command to General McClellan in the operations in West Virginia, engaging successfully in the actions at Rich Mountain, Va., and at Carnifax Ferry, Va., Sept. 10, 1861. In May, 1862, he commanded the right wing of the Army of the Mississippi during the siege of Corinth; and on June 11, 1862, succeeded General Halleck in the command of that army. On Oct. 26, 1862, he relieved General Buell of the command of the Army of the Cumberland, and on Oct. 30 began his memorable march to Nashville, Tenn. Owing to his defeat at Chickamauga in September of the following year he was superseded in command by General Thomas and assigned to the Department of Missouri. He was deprived of his command Dec. 9, 1864, whereupon he retired to Cincinnati, where he remained inactive till the close of the war. In 1868 he was appointed United States minister to Mexico; in 1880 and 1882 was elected to Congress; and in June, 1885, was appointed register of the United States Treasury. An act passed in 1898 restored him to the rank of Brigadier-General in the army and placed him on the retired list. He died near Redondo, Cal., March 11, 1898.

Rosegger, Petri Kettenfeier, an Austrian poet and novelist; born in Alpl, a small village in the Styrian Alps, July 31, 1843. His youth was one of great poverty, and at 17 he was apprenticed to a tailor; but the exceptional merit of his poetry secured him patronage which enabled him to devote himself exclusively to literature. His first book, "Zither and Cymbals" (1869), a collection of poems in the Styrian dialect, met with immediate success. The best known of his other works which include stories, sketches, and novels concerning the peasant life about him are: "Tales of the Alps" (1873); "Out of the Woods" (1874); "The Seeker after God" (1883); "The Last Jacob" (1888); "Hoch vom Dachstein" (1892); and "Peter Mayr" (1894).

Rosell, Gayetano, a Spanish litterateur; born in Madrid, Spain, about 1815. He followed the career of a journalist, writing many successful articles in criticism and history. He published: "The Mother of St. Frederick," a drama well received; "Before You Marry," "The Hypocrite," and "For a Watch and a Hat," all comedies; "History of the Naval Combat of Lepanto," regarded as the best description of that battle ever written; and many translations.

Rosemary, the *Rosmarinus officinalis*, a native of the S. of Europe and Asia Minor, and cultivated in India, etc.; a very fragrant labiate plant with a white or pale-blue corolla. The leaves are sessile and

Rosenthal-Bonin

gray with edges rolled round below. It is sometimes made into garlands. It is slightly stimulant, and tends to relieve



ROSEMARY.

headache and mental weariness. It is an ingredient in Hungary-water. It is also used as a conserve, and a liquor is made from it.

Rosen, George, Baron de, a Russian poet; born in St. Petersburg, Russia, in 1805. A friend and imitator of Pushkin, his "Three Poems" (1827) met with immediate success; as did the succeeding volumes, including "The Mystery" (1828); "The Virgin among the Angels" (1828); and "The Birth of Ivan the Terrible." He also wrote tragedies, operas, and translations. His poetry is harmonious, elegant, and full of melancholy; but lacks force and originality. He died in 1860.

Rosenkranz, Johann Karl Friedrich, a German philosopher; born in Magdeburg, Prussia, April 23, 1805. He was the best representative of the "center" of Hegel's school, and spent much time in rearranging and reclassifying the system. His principal works, nearly all of which have received English versions, are: "Psychology, or the Science of Subjective Mind" (1837); "Critical Explanations of Hegel's System" (1840); "Life of Hegel" (1844); "Modifications of Logic" (1846); "System of Science" (1850); "Æsthetics of the Ugly" (1853); "Autobiography" (1873); "The History of Literature" (1875). He died in Königsberg, Prussia, June 14, 1879.

Rose Noble, an English coin of the value of \$1.60, formerly current, and first coined in the reign of Edward III.

Rosenthal-Bonin, Hugo, a German novelist; born in Berlin, Oct. 14, 1840. He

wrote a great number of successful novels, including: "The Obstacle to Marriage" (1876); "Subterranean Fire" (1879); "The Diamond Polisher" (1881); "Black Shadows" (1884); "The House with Two Entrances" (1885); and "The Captain's Daughter" (1887).

Rosenthal, Moritz, a German pianist; born in Lemberg, Austria-Hungary, Dec. 18, 1862. In 1876 he gave his first concert, which led to fame; in 1878 was pianist to the Rumanian Court; in 1878-1895 played in the principal cities of Europe; and in 1895 made his first appearance in London, where he was enthusiastically received.

Rose of Jericho (*Anastatica hierochuntica*), a plant of the natural order *Cruciferae*, which grows in the sandy deserts of Arabia, and on rubbish, the roofs of houses, and other situations in Syria and other parts of the East. It is a small, bushy, herbaceous plant, seldom more than six inches high, with small white flowers; and after it has flowered the leaves fall off, and the branches become incurved toward the center, so that the plant assumes an almost globular form, and in this state it is often blown about by the wind in the desert. When it happens to be blown into water the branches expand again, and the pods open and let out the seeds. Numerous superstitions are connected with this plant, which is called *Rosa Mariæ* or Rose of the Virgin. If taken up before it is quite withered the plant retains for years its hygrometric property of contracting in drought and expanding in moisture.

Roses, Wars of the, a disastrous dynastic struggle which desolated England during the 15th century, from the first battle of St. Albans (1455) to that of Bosworth (1485). It was so called because the two factions into which the country was divided upheld the two several claims to the throne of the Houses of York and Lancaster, whose badges were the white and the red rose respectively. The Lancastrian claim to the crown came through John of Gaunt, third son of Edward III., created Duke of Lancaster in 1362, having married three years before the heiress of Henry, Duke of Lancaster. On John of Gaunt's death King Richard II. seized his lands, whereupon his son Bolingbroke, then in exile, returned to assert his rights, and, finding his cause exceedingly popular, was emboldened to claim the crown, which was granted him by the Parliament after the deposition of his cousin Richard II. After the House of Lancaster had thus possessed the throne for three reigns (Henry IV., V., VI.), Richard, Duke of York, during the weakness of the last reign, began to advance, at first somewhat covertly, his claim to the throne. He was the son of Richard,

Earl of Cambridge, by Anne, sister of Edmund Mortimer, the last Earl of March, and he was thus the nearest actual heir to Edward III. through his second son, Lionel, Duke of Clarence.

The reigning family had become unpopular from its loss of France and its clericalism, but its strength was great in the N., where the power of the Percies was alone rivalled by that of the Nevilles. The Yorkist strength lay chiefly in the mercantile population of the S. counties. The effect of the war was the almost complete destruction of the old nobility, the weakening of the power of the Church, and an enormous increase in the power of the crown, together with the great advance of the commercial classes and the large towns, destined a few generations later to measure strength with the crown itself. In 1454 Richard was appointed protector of the realm during Henry's insanity, and on his recovery soon after took up arms against his rival Somerset and crushed him at the first battle of St. Albans (1455). A second period of insanity again gave him the protectorship, but the king recovered in 1456. His weak attempts at reconciliation proved failures, and in 1460 the Yorkist earls of Salisbury, Warwick, and March defeated and captured the King of Northampton (1460).

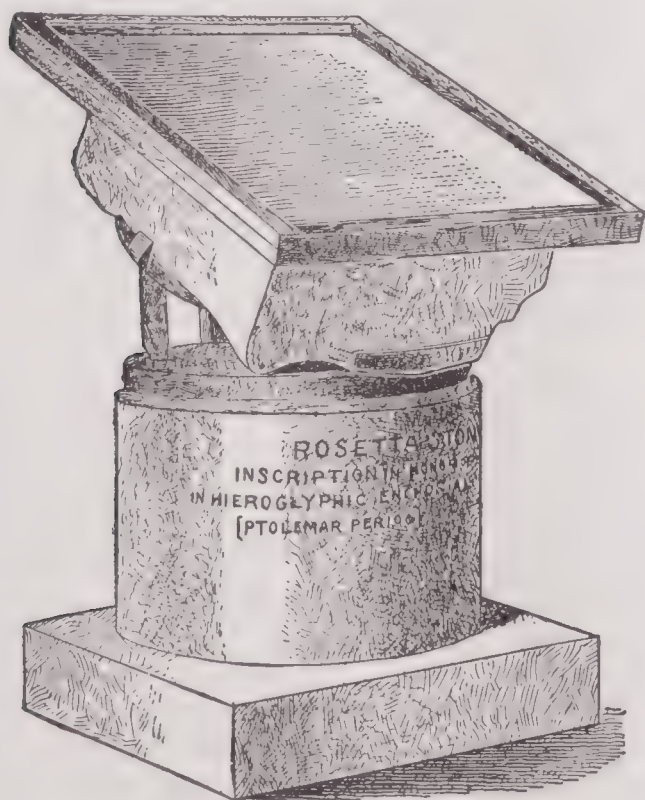
The lords now decided to grant the reversion of the crown to York, passing over Prince Edward. The queen refused assent and fled to Scotland, returning only after the death of York at Wakefield (Dec. 30, 1460); but York's son Edward quickly gained a victory at Mortimer's Cross (1461) though Warwick was defeated by the queen's main body in the second battle of St. Albans (1461). But London rallied to young Edward, and in June he was crowned at Westminster after the great victory of Towton (1461). Next year Queen Margaret again appeared in the N. but in 1464 her forces were utterly routed by Warwick's brother, Montague, at Hedgeley Moor and Hexham. The estrangement of Warwick and his alliance with Queen Margaret's party drove Edward IV. from England and restored Henry VI. But Edward returned in the spring of 1471, defeated (and slew) Warwick at Barnet, and the queen at Tewkesbury. The murder of Prince Edward after the battle, and the convenient death of Henry VI. in the Tower, cleared away his two chief dangers and left him to reign in peace. The accession of Henry VII. after the death of Richard III. on Bosworth field (1485), his marriage with Elizabeth, daughter of Edward IV. (1486), and the blending of the red and white rose in the Tudor badge, marked the termination of the Wars of the Roses, though the reign of Henry, whose own title was not good, was from

Rosetta

time to time disturbed by the pretensions of Yorkist impostors.

Rosetta, a town of the Nile delta in Egypt, on the old Bolbitic arm of the river, 9 miles from its entrance into the Mediterranean and 44 miles N. E. of Alexandria. Two forts and a lighthouse stand near the mouth of the river. A bar of sand prevents large vessels from entering. Rosetta has been outstripped as a commercial port by Alexandria. In the time of the Crusades it was a place of great strength; and St. Louis made it the basis of his crusading operations. Sultan Beybers, after that (in 1251) founded the present city farther inland. The Arabs call it Raschid, believing that Haroun al-Raschid founded the old city. A few miles to the N. of the town was discovered the ROSETTA STONE (*q. v.*). At Rosetta too are barrage works for holding up the Nile water till it can be directed into the irrigation channels. These works, originally constructed by Mougel Bey (1843-1861), were almost entirely rebuilt by Sir C. Scott Moncrieff in 1886-1890. The barrage is 508 yards long, and has 61 arches. Pop. about 16,000.

Rosetta Stone, the name given to a stone found near the Rosetta mouth of the Nile by a French engineer in 1798. It is a



ROSETTA STONE.

tablet of basalt, with an inscription of the year 136 B. C., during the reign of Ptolemy Epiphanes. The inscription is in hieroglyphic, in demotic, and in Greek. It was deciphered by Dr. Young, and formed the key to the reading of the hieroglyphic characters. It was captured by the English on the defeat of the French forces in Egypt, and is now kept in the British Museum.

Rosewood

See HIEROGLYPHIC: CHAMPOLLION, J. F.; YOUNG, T.

Rosetta Wood, a good-sized East Indian wood, imported in logs, 9 to 14 inches in diameter; it is handsomely veined, and its general color is a lively red-orange. The wood is close, hard, and very beautiful when first cut, but soon becomes darker by exposure to the air.

Rosetti, or **Roseti**, **Constantin**, a Rumanian poet and politician; born in Bucharest, Rumania, June 14, 1816. He published a volume of poems under the title of "Hours of Contentment" (1843); and wrote many political treatises, poems, and translations, a new edition of which appeared in Bucharest in 1885. He died April 19, 1885.

Rose Window, a circular window, divided into compartments by mullions and tracery radiating from a center, also called *Catharine wheel* and *marigold window* according to modifications of the design. It forms a fine feature in the church architecture of the 13th and 14th centuries, and is mostly employed in the triangular spaces of gables. In France



ROSE WINDOW.

it is much used, and, notwithstanding difficulties of construction, attained great size. Some examples, as that of Rheims Cathedral, are over 40 feet in diameter.

Rosewood, a valuable wood, the best of which comes from Brazil. Two kinds, or two qualities, are known in commerce. These much resemble each other, the one, which is usually rather the better figured of the two, coming from Rio de Janeiro, and the other from Bahia. Though Brazilian rosewood has been used for making furniture in Europe for more than 200 years, the species of tree or of trees which yield it are not known to European botanists. Mr. Bentham, judging by the appearance of the wood and of the leaves of the tree, or of one of those rosewood trees, has assigned it to the genus *Dalbergia*. This view is probably correct. At all events there are three well-known Indian species of this genus called respectively, *D. latifolia*, *D. sissoo*, and *D. cultrata*, all of which, except that they want the dark blotchy veining, closely resemble the Brazilian rosewoods. The cellular structure of the wood is similar in the whole of them. They are all rich in resinous coloring mat-

ter, and all except *D. latifolia*, which is slightly lighter, have a specific gravity ranging between .900 and 1.000, so that they just float in water. Since at least 1830 the *D. latifolia* has been known in England as Indian rosewood. The South American and Indian kinds named above are all hard and durable and take a fine polish. They are in every way excellent furniture woods, the Brazilian kinds being only more valuable because they are more beautifully figured. The Indian rosewood is often elaborately carved by native workmen, and for this purpose it is well suited. Of late years much of the furniture, even of a superior kind, made of mahogany in Great Britain, has been stained of a rosewood color. An inferior kind of rosewood is brought from Honduras. The name is said to have been given because of a striking rose-like odor that the wood gives out when freshly cut.

Rosicrucian, of or belonging to Rosenkreuz or the society which he is said to have founded.

Rosicrucians, a mystic secret society which became known to the public early in the 17th century, and was alleged to have been founded by a German noble called Christian Rosenkreuz, A. D. 1388. He was said to have died at the age of 106. The society consisted of adepts, who perpetuated it by initiating other adepts. It did not interfere with religion or politics, but sought after true philosophy. The Rosicrucians pretended to be able to transmute metals, to prolong life, and to know what was passing in distant places. Many contradictory hypotheses have been brought forward regarding the Rosicrucians, and as it is admitted that their secret was never revealed, it is open to doubt if there was one to reveal. They are said to have died out in the 18th century. The writer of the article "Rosicrucians" in the "Encyclopædia Britannica" believes that the Rosicrucian Society never existed, and that the persons making it known did so simply for a jest. As, however, the public believed in its existence, individuals from time to time declared that they belonged to it. Called also Brothers of the Rosy Cross. See ANDREÄ, JOHANN V.

Rosier, Joseph Bernard, a French dramatist; born in Béziers, Hérault, Oct. 18, 1804. His well-known comedies are bright and full of wit. They include: "The Husband of my Wife" (1830); "A Criminal Case" (1836); "At Thirty Years" (1838); "The Protégé" (1839); "Raymond" (1851); "Every One for Himself" (1856); etc. He died in Marseilles, France, Oct. 12, 1880.

Rosin. See RESIN.

Rosini, Giovanni (rō-sē'ne), an Italian littérateur; born in Lucignano, Tuscany, Italy, June 24, 1776. His poem entitled

"The Marriage of Jupiter and Latona" (1810), written on the occasion of the marriage of Napoleon with Marie Louise, was awarded an imperial prize of \$2,000. His many works of prose and poetry include: "Poems" (1819); three historical romances, translated into many languages — "The Nun of Monza" (1829), "Count Ugolin de la Gherardesca," and "Luisa Strozzi" (1833); and a historical drama, "Torquato Tasso" (1835). He excels as a literary and artistic critic, and his "History of Italian Painting" (1834) is highly valued. He died May 16, 1855.

Roslin, a Midlothian village, near the wooded glen of the North Esk, 6½ miles S. of Edinburgh, Scotland. Its castle, dating from the 14th century, was the seat of the St. Clairs, Earls of Orkney from 1379 to 1471, and afterward of Caithness, and hereditary grand-master of Masons of Scotland from 1455 to 1736. The exquisite "chapel" built about 1450, is really the choir of an intended collegiate church, and is only 70 feet long, 35 broad, and 42 high. Its beauty lies not in the outline, but in the profusion of stone-carving lavished on pinnacles, niches, vaulted roof, and clustered columns, and especially on the famous "Prentice pillar." The building, essentially Scotch, has often been wrongly ascribed to Spanish, at any rate to foreign, masons. Much damaged by an Edinburgh mob in 1688, it was restored by the 3d Earl of Rosslyn at a cost of \$25,000, and has served since 1862 as an Episcopal church. On Roslin Moor the Scotch are said to have twice defeated the English in one day, Feb. 24, 1303.

Rosmini, Antonio Rosmini-Serbati, an Italian philosopher; born of noble family at Roveredo in the Italian Tyrol, March 25, 1797. He grew up a pure and beautiful child, and after a stainless youth of devotion and study decided for the priesthood against his parents' wishes, and began the course at Padua in 1817. Three years later his father's death gave him an ample estate. He was ordained priest in 1821, and devoted the next five years at home with a serene but profound enthusiasm to study, meditation, and prayer. He read widely in philosophy alike ancient and modern, and already revolved within his mind a comprehensive and coherent system to serve as a basis for the truths of revelation, while on the practical side he planned a new institution for the training of teachers and priests in wisdom and holiness. From 1826 to 1828 he lived mostly in Milan, next thought out the rule of his new order in a period of retirement and severe mortification at Domodossola in the Piedmontese Alps, visited Rome, gained the approval of Pius VIII. both for his special studies and for the institution of his order, and published his "New Essay on the Origin of Ideas" (4 vols. 1830), which at

once carried his name over the Catholic world.

After a few years of labor at Trent, hampered by the jealousy of the Austrian government, which feared his Italian patriotism and his papal sympathies, he settled in 1837 at Stresa on the W. shore of Lago Maggiore, and two years later received from Gregory XVI. the formal approval of his institute. The next few years were the happiest and most fruitful of his life. Surrounded by loving and devoted friends, he sent volume after volume to the press; overpowered by his logic noble opponents to his philosophy like Vincenzo Gioberti and Count Mamiani, as well as no less able writers from the rationalistic and anti-Catholic side; and foiled the restless intrigues of Jesuit enemies, who saw in his enterprise possible dangers to the supremacy of their order. His dream in politics, as expressed in his "Constitution according to Social Justice" (1848), was a confederation of the States of Italy under the Pope as perpetual president; but his heart sank within him when the Pope declared his intention to take no part in the war of liberation against Austria.

For a brief period he basked in the papal favor, and was promised by Pius IX. a cardinal's hat; while for seven weeks he served as the envoy of Piedmont at the papal court, and it was he whom the Romans asked for as their Liberal minister in the period between the murder of Rossi and the Pope's flight to Gaeta. He followed the Pope, but now found his mind poisoned against him by the malign suspicions of Antonelli and the reactionary party, and never afterward regained his confidence. His "Constitution" and "The Five Wounds of Holy Church" (Eng. trans. ed. by Canon Liddon, 1883) were next prohibited by an irregular meeting of the Congregation of the Index called at Naples. Rosmini submitted without a word of protest, and returned to Stresa to spend the remaining seven years of his life in even more absolute devotion than before to his institute and to the composition of works intended to complete and consolidate his system of philosophy. His enemies still continued to pursue him with wicked calumnies and charges of heresy in doctrine and unfaithfulness to the Holy See. But their malignity overshot its mark, and at length the Pope, his eyes opened to see how he had wronged Rosmini by his haste, granted him a fair hearing, first enjoining silence on his traducers, and next subjected his whole published works to a careful scrutiny in relation to the more than 300 charges brought against them. The process lasted nearly four years (1851-1854), but at its close the Congregation of the Index, the Pope presiding, declared Rosmini's writings to be entirely free from censure, and enjoined perpetual silence on all his accusers. But he did not long survive

a triumph for which he had waited with saintly patience, dying in Stresa, July 1, 1855.

The "Institute of the Brethren of Charity" survived its founder, and among the Rosminian Fathers, who are mostly Italians or Englishmen, are to be found at the present day some of the ablest and most devoted sons of the Roman Church. Its fundamental idea is the principal of passivity, its aim holiness or the moral perfection of the soul. Moral perfection consists in justice or the practical recognition of each being seen in the idea, according to the beingness that is in it. The elective or contemplative part of the discipline prepares for the assumptive or active part, whose constant aim is the well-being of others. The brethren, who include both clerical and lay-members, undergo a two years' novitiate and take the three ordinary vows, but wear no distinctive dress and conform to the laws of the country in which they happen to be. The Institute of Charity was a large-minded attempt to adapt the monastic system and Catholic Christianity generally to the needs of the present day, and its comparative lack of success is only due to the enormous force of interested opposition brought to bear against it by the obscurantist party in the Church, whose chief end is despotic power for itself and blind obedience from the people. In England it has foundations at Ratcliffe, Loughborough, Cardiff, Wadhurst, Rugby, and established in 1876 its central house at St. Ethelreda's, Holborn, once the domestic chapel of the palace of the Bishops of Ely.

The foundation of Rosmini's philosophy is being considered as the form of the intelligence—an elemental intuition of which is implanted by Nature herself. He begins by pointing out, as an essential characteristic of cognition, a distinction between the impersonal object known and the personal subject or knower. Human cognitions are intuitions and affirmations, and the former necessarily precede the latter, since they regard things in their possibility rather than merely formulate assertions as to whether they subsist or do not subsist. Intuition then gives us possible objects—ideas; affirmation, things subsistent. Of ideas we may affirm (1) that they are not nothing; (2) that they are not ourselves; (3) that they have a mode of existence of their own, entirely different from that of real or subsistent things, and independent of the bodily sense. Their two essential characteristics are universality and necessity; for real objects and sensations are always particular, instead of being universal and generic, and every object which involves no contradiction is necessarily possible. These two characteristics involve two others, infinity and eternity; the origin of the ideas comes from God, for man does not re-

ceive them from the things themselves. The one indeterminate and wholly universal idea is that of being or existence; we cannot determine the subsistence of an object until we first have the idea of it, therefore perception involves the idea which is further isolated from all the other elements of the perception by the process of universalization, through which it may be realized an indefinite number of times. When the ideas are all fully or perfectly determined, they are called concrete; when they remain to a certain extent indeterminate, they are abstract.

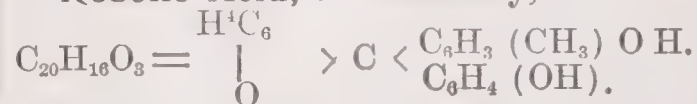
The determinations of the ideas are sensations; these are merely the occasions of its discovery by the intelligence, which can admit that to be possible which the sensation represents as real. By the process of universalization then we form those ideas which are completely determined; by abstraction; those which are determined only to a certain extent. It is this idea of being which makes intelligence possible: it is the necessary form of human reason, the indispensable condition given by nature herself, the parent idea which generates all others. It is cognizable by itself, as otherwise there is nothing else that could make it known; the idea of being gives us itself the essence of the thing. Herein is secured the objectivity of truth — the faculty of recognizing the essence of things, the foundation of the divine imperative of duty in the conscience of man, the logical foundation on which faith and charity may be supernaturally built. Being is incorporeal, independent of space, spiritual, and therefore incorruptible and immortal. It is independent of time; as being in its essence is always being, and as it would be a contradiction in terms for being to cease to be being, it is eternal. But since it was united to the soul in time, it must have existed before it and be independent of it. And thus we reach an Intelligence anterior to human intelligence — an Eternal Mind. This eternal mind is God's, and therefore God exists, and His existence and the immortality of the soul remain the true foundation of morals. But being as intuitively seen by nature merely gives the certainty that God exists; it cannot make God known to us till we are illumined by a new faculty — an influx of objective light, the Light of Grace. Thus a necessary place for revelation is found in the essential limitations of man's nature, and this revelation of God is contained in the Gospel of Jesus Christ, which alone can harmonize all the contradictions of the universe.

Rosmini, Carlo de, an Italian historian and biographer; born in Roveredo, Tyrol, Oct. 29, 1758. After attempts at poetry and poetic criticism, he wrote his finest work, "Life of Victorin de Feltre" (1801). Among his many other books may be named: "Life of Ovid" (1789); "Memoirs on the Life and Writings of Clement Baroni

Cavalcabro" (1798); "The Exemplary Life and Death of Marie Josephine Repetti, a Young Milanese" (1815); and "History of Milan" (1820). He was a most conscientious hagiographer, withdrawing from the world and living almost the life of a hermit that he might devote himself more closely to his work. He died in Milan, Italy, June 9, 1827.

Rosny, Antoine Joseph Nicolas de, a French miscellaneous writer; born in Paris, France, in 1771. He was one of the most prolific writers of his century. His first book, "The Unfortunates of La Galetière" (1796), a romance, was followed with almost inconceivable rapidity by more than 80 volumes, among them being: "Life of Florian" (1797); "The Oracle of Apollo" (1800); and "Literary View of France during the Thirteenth Century" (1809), an attempt to finish the work on the literary history of France, material for which had been collected by the Benedictines of St. Maur. Chagrin at the miserable failure of his project hastened his death. He died in Valenciennes, France, Oct. 21, 1814.

Rosolic Acid, in chemistry,



a weak acid prepared by treating rosaniline with nitrous acid, and boiling the resulting diazo-compound with hydrochloric acid. It forms shining monoclinic prisms, closely resembling those of aurine, melts above 220°, is insoluble in water, but dissolves readily with brownish-yellow color in alcohol and ether. Boiled with aniline and benzoic acid it yields a beautiful and permanent blue dye.

Ross, Clinton, an American novelist; born in Binghamton, N. Y., July 31, 1861; was educated at Phillips Academy, Andover, and in Europe; graduated at Yale in 1884. He published: "The Silent Workman" (1886); "The Gallery of a Random Collector" (1888); "The Countess Bettina"; "The Speculators"; "Adventures of Three Worthies"; "Improbable Tales"; "Two Soldiers and a Politician"; "The Puppet"; "The Scarlet Coat"; "Battle Tales"; "Bobbie McDuff"; "The Meddling Hussey"; "Zuleika"; "Heroes of Our War With Spain"; etc.

Ross, Sir James Clark, an English Arctic and Antarctic explorer; born in London, England, April 15, 1800. He entered the British navy at the age of 12, accompanied his uncle, Sir John Ross, on his two voyages in search of a N. W. passage, and in the interval between them accompanied Capt. William Parry in his three Arctic voyages. He was promoted to the rank of post-captain in 1834, particularly for the discovery of the North magnetic pole in 1831. He commanded the expedition in

the "Erebus" and "Terror" to the Antarctic Ocean in 1839-1843; and on his return published a narrative of that voyage, which had contributed largely to geographical and scientific knowledge generally. Captain Ross was knighted for his services, and received numerous other honors. In 1848 he made a voyage in the "Enterprise" to Baffin Bay in search of Sir John Franklin. He died in Aylesbury, England, April 3, 1862.

Ross, Sir John, an English Arctic navigator; born in Inch, Wigtownshire, Scotland, June 24, 1777. In 1786 he entered the navy, and he saw a considerable amount of service before the peace of 1815, which found him with the rank of commander. In 1817 he accepted the command of an admiralty expedition to search for a N. W. passage, and in April, 1818, set sail in the "Isabella," accompanied by Lieutenant Parry in the "Alexander." After passing through Davis Straits and Baffin Bay the vessels entered Lancaster Sound and proceeded up it for a considerable distance, when Ross conceived the erroneous idea that the sound was here brought to a termination by a chain of mountains, and accordingly returned to England. Shortly after landing he was advanced to the rank of post-captain, and the following year published an account of his voyage. His next expedition, in the steamer "Victory," was equipped by Sir Felix Booth and set out in May, 1829. Ross entered Prince Regent Inlet and discovered and named Boothia Felix and King William Land. In 1832 he was forced to abandon his ships, and he and his crew suffered great hardships before they were picked up in August, 1833, by his old ship, the "Isabella." In 1834 Captain Ross was knighted, and in the following year published a narrative of his second voyage. From 1839 till 1845 he was consul at Stockholm. In 1850 he made a last Arctic voyage in the "Felix," in a vain endeavor to ascertain the fate of Sir John Franklin. He became a rear-admiral in 1851, and died in London, England, Aug. 30, 1856.

Rosse, William Parsons, 3d Earl of, an English astronomer; born in York, England, June 17, 1800. Though a representative Irish peer, Lord Rosse's chief attention was devoted to the study of practical astronomy. In 1827 he constructed a telescope, the speculum of which had a diameter of three feet, and the success and scientific value of this instrument induced him to attempt to cast a speculum twice as large. After innumerable difficulties, for every step had to be pioneered by experiment, and after many failures, Lord Rosse succeeded in 1845 in perfecting machinery which turned out the huge speculum, weighing three tons, without warp or flaw. It was then mounted in his park at Parsonstown, at a cost of \$150,000 on a telescope

54 feet in length with a tube 7 feet in diameter. A series of cranks, swivels, and pulleys enables this huge instrument to be handled almost with as much ease as telescopes of ordinary size. The sphere of observation was immensely widened by Lord Rosse's instrument, which has been chiefly used in observations of nebulae. He died Oct. 31, 1867.

Rossetti, the name of an Italian family, the most famous members of which were:

ROSSETTI, GABRIELE, an Italian poet and critic; born in Vasto, Abruzzo Citeriore, then forming part of the kingdom of Naples, Feb. 28, 1783. His father, Nicola Rossetti, was engaged in the iron-trade of the district; his mother was Maria Francesca Pietrocola. The parents were not in easy circumstances, and had a large family; besides Gabriele, two of the sons attained some eminence, Andrea becoming a canon in the Church, and Domenico being well reputed in letters and antiquities. Gabriele gave early signs of more than common ability, and was placed by the local grandee, the Marchese del Vasto, to study in the University of Naples. He had a fine tenor voice, and was sometimes urged to try his success on the operatic stage; he drew with such precision that some of his extant pen-drawings with sepia-ink might readily be taken for steel engravings; he composed poetry, both written and improvised, and became one of the most noted improvisatori in Naples. The boyhood and youth of Rossetti passed in a period of great political commotion, consequent on the revolutionary and imperial wars of France. The Bourbon King of Naples, Ferdinand I., was ousted by the Parthenopean Republic, and again by King Joseph, the brother of Napoleon, and his successor King Joachim (Murat), the emperor's brother-in-law, and Ferdinand had to retire to Sicily.

Rossetti obtained an appointment as curator of ancient bronzes in the Museum of Naples, and also as librettist to the operatic theater of San Carlo: he wrote the libretto of an opera, "Giulio Sabino," was well received at the court of the Napoleonic sovereigns, and in 1813 acted as a member of the provisional government sent to Rome by Murat. After the restoration of Ferdinand to Naples in 1815 he continued his connection with liberal politicians and joined the widely-diffused secret society of the Carbonari. In 1820 a military uprising compelled King Ferdinand to grant a constitution on the model of that which had recently been established in Spain. Rossetti saluted its advent in one of his most celebrated odes, beginning, "Beautiful indeed art thou, with the stars in thine hair." The good faith of the king was highly dubious from the first, and in 1821 he abrogated the constitution and put it down with the aid of Austrian troops. The Con-

stitutionalists were proscribed and persecuted, Rossetti among them. Two verses in one of his lyrics are said to have given especial offense to the king—"For Sands and Louvels are not yet dead"—alluding to the assassination of Kotzebue and of the Duc de Berri. Rossetti had to escape from Naples with the kindly connivance of the British admiral, Sir Graham Moore, who shipped him off to Malta in the disguise of a British naval officer. In Malta he was treated with great liberality and distinction by the governor, and toward 1824 he went to London, with good recommendations, to follow the career of a teacher of Italian.

In 1826 he married Frances Mary Lavinia Polidori, daughter of a Tuscan father and English mother; soon afterward he was elected Professor of Italian in King's College, London. They had four children: (1) Maria Francesca, born 1827, died 1876 (author of "A Shadow of Dante," etc.); (2) Gabriel Charles Dante (see below); (3) William Michael, born 1829 (critical writer, and editor of Shelley; see below); (4) Christina Georgina (see below). In London Rossetti lived a studious, laborious, and honorable life, greatly respected by his pupils and by Italian residents and visitors. He was a man of strong and steady affections and vivacious temperament, earnest and single-minded in all his pursuits. In politics he was a vigorous liberal, but more inclined to a constitutional monarchy than a republic; in religion he was mainly a freethinker, but tending in his later years toward an undogmatic form of Christianity. Though totally opposed to the papal system and pretensions, he would not openly abjure, in a Protestant country, the Roman Catholic creed of his fathers. His health began to fail in 1842, and his sight became dim, one eye being wholly lost. After some attacks of a paralytic character he died in London, April 26, 1854.

Besides some poems published in Italy, Rossetti produced the following works: "Dante, Commedia" (the Inferno only was published), with a commentary aiming to show that the poem is chiefly political and anti-papal in its inner meaning (1826); "Lo Spirito Antipapale che produsse la Riforma" ("The Anti-Papal spirit which produced the Reformation"—an English translation also was published), reinforcing and greatly extending the same general views (1832); "Iddio e l'Uomo, Salterio" ("God and Man, a Psalter"), poems (1833); "Il Mistero dell'Amor Platonico del Medio Evo" ("The Mysterious Platonic Love of the Middle Ages"), five volumes, a book of daring and subtle speculation tending to develop the analogy between many illustrious writers as forming a secret society of anti-Catholic thought, and the doctrines of Gnosticism and Free Masonry (1840); this book was printed and prepared for publication,

but withheld as likely to be deemed rash and subversive; "La Beatrice di Dante," contending that Dante's Beatrice was a symbolic personage, not a real woman (1842); "Il Veggente in Solitudine" ("The Seer in Solitude"), a speculative and partly autobiographical poem (1846); it circulated largely, though clandestinely, in Italy, and a medal of Rossetti was struck there in commemoration; "Versi" (miscellaneous poems) (1847); "L'Arpa Evangelica" ("The Evangelic Harp"), religious poems (1852). The views of Rossetti regarding Dante, along with Petrarca and many other Italian authors, excited a great deal of controversy, which still continues in various forms and with varying fortunes. His memory is much revered in his native place, where the house of his birth has been bought as public property, and a theater and the chief square have been named after him.

CHRISTINA GEORGINA, an English poet; born in London, England, Dec. 5, 1830, daughter of the preceding. "Goblin Market" (1862) is regarded as her finest production. Her other writings consist chiefly of lyric poems of great beauty, and sonnets mostly of a grave and simple devotional order. They include: "The Prince's Progress" (1866); "Commonplace, and Other Short Stories" (in prose: 1870); "Sing-Song: A Nursery Rhyme Book" (1872); "Annus Domini: A Prayer for Each Day in the Year" (1873); "Speaking Likenesses" (1874); "Seek and Find" (1879); "A Pageant, and Other Poems" (1881); "Letter and Spirit" (1883); "Verses" (1893); and several posthumous works. She died Dec. 29, 1894.



CHRISTINA G. ROSSETTI.

DANTE GABRIEL (or properly GABRIEL CHARLES DANTE), an English painter and poet; born in London, May 12, 1828, eldest son of Gabriele. He was educated in King's College School, London; but, having from his earliest years evinced a wish to become a painter, he was taken from school in 1843 and began the study of art, entering soon afterward the antique school of the Royal Academy. Here he associated with the young painters John Everett Millais and William Holman Hunt, and the sculptor Thomas Woolner; along with these three he founded the so-called

Pre-Raphaelite Brotherhood, which was completed by the addition of three other members. The chief incentive to the foundation of this society, and of the school of art which it initiated, was the distaste and disrespect felt by the youthful artists for the poverty-stricken conceptions and slurred execution which marked most of the art then current in England, mingled with a sincere and reverent delight in those qualities of genuine and spontaneous invention, lofty feeling, and patient handiwork, which had been developed by the European schools of art preceding the culmination of Raphael and his followers.

A natural result of this frame of mind was a disposition to realize objective details to the utmost, with a view to the thorough authenticity of the visible means through which ideas are conveyed; but it was a mistake of some observers, who noticed a scrupulous exactness and sometimes a plethora of details, to suppose that the main concern of the associated artists was really with the details and not with the ideas. The English Pre-Raphaelites wished to exhibit true and high ideas through the medium of true and rightly elaborated details. Two other mistakes have been frequently repeated concerning these artists; first, that they were an offshoot of the "Tractarian" movement, guided by religious pietism; and second, that they were set going by Ruskin. Rossetti's earliest oil picture, exhibited in 1849, was "The Girlhood of Mary Virgin"; his next (1850), now in the National Gallery, "The Annunciation." After this he withdrew from exhibiting almost entirely, and his art developed through other phases, in which the sense of human beauty, intensity of abstract expression, and richness of color were leading elements. He produced numerous water-colors of a legendary or romantic cast, several of them being from the poems of Dante, others from the Arthurian tradition.

Among his principal oil pictures are the Triptych for Llandaff Cathedral, of the "Infant Christ Adored by a Shepherd and a King," "The Beloved" (the Bride of the Canticles), "Dante's Dream" (now in the Walker Gallery, Liverpool), "Beata Beatrix" (National Gallery), "Pandora," "Proserpine," "The Blessed Damozel" (from one of his own poems), "The Roman Widow," "La Ghirlandata," "Venus Asartate," "The Day-dream." He designed several large compositions, such as the "Magdalene at the door of Simon the Pharisee," "Giotto Painting Dante's Portrait," "Cassandra," and the "Boat of Love" (from a sonnet by Dante); but these he failed to carry out as pictures on an adequate scale, partly owing to his receiving constant commissions to execute smaller works, consisting mostly of female half-figures ideal in invention or feeling, and executed in life-

size. The early studies of Rossetti in art had not been so steady or systematic as might have been wished. Afterward, beginning in 1848, he had the advantage of some friendly training from his constant intimate, Ford Madox Brown, the historical painter; but, notwithstanding his passionate impulse as an inventive artist, and his impressive realization of beauty in countenance and color, some shortcomings in severe draughtmanship and in technical method, and some degree of mannerism in form and treatment, have often, and not unjustly, been laid to his charge.

Rossetti began writing poetry about the same time that he took definitely to the study of painting. Besides some juvenile work, and some translations from the German (that of "Henry the Leper," by the mediæval poet, Hartmann von der Aue, is preserved), he executed a number of translations from Dante and other Italians, published in 1861 as "The Early Italian Poets," and again in 1874 as "Dante and his Circle." Two of his best-known original poems, "The Portrait" and "The Blessed Damozel," were written in his 19th year, and many others followed. These were about to be published in 1862 in a volume (some of them having been previously printed in magazines — chiefly in "The Germ," 1850, and "The Oxford and Cambridge Magazine," 1856), but a domestic calamity intervened, and all idea of publication was set aside for some years. Rossetti had fallen in love toward 1851 with a very beautiful girl, a dressmaker's assistant, named Elizabeth Eleanor Siddal; he married her in 1860, but she died suddenly in February, 1862. In the first impulse of desperation he buried his MSS. in her coffin. In 1869 he thought fit to recover them, and in 1870 he issued his volume named "Poems," containing the bulk of those compositions and several others written not long before the date of publication. This volume was a success with poetical readers, and was reviewed with great admiration and even enthusiasm by some leading critics. Late in 1871, however, Mr. Robert Buchanan, writing in the "Contemporary Review" under the pseudonym of "Thomas Maitland," attacked the book on literary, and more especially on moral grounds, and soon afterward he republished his article, "The Fleshly School of Poetry," as a pamphlet.

Rossetti was now in a depressed state of health, suffering much from insomnia, from an abuse of chloral as a palliative, and from weakened eyesight (he often thought he would become blind, as his father had very nearly been). The literary detraction, conspiring with physical malady, produced a strong and exaggerated effect on him; and from about the middle of 1872 he became morbidly sensitive and gloomy, and very recluse in his habits of life, though his nat-

urally strong sense, and his turn of mind, in which a good deal of humor and practicability was blended with idealism, continued to form a substantial counterbalance. In 1881 he published a second volume of poems named "Ballads and Sonnets" (containing some of his finest work, "Rose Mary," "The White Ship," "The King's Tragedy," and the completed sonnet-sequence, "The House of Life"), and at the same time he reissued, with some omissions and interpolations, the "Poems" of 1870. His health was by this time extremely shattered. A touch of paralysis affected him toward the end of 1881, and, retiring in the hope of some improvement to Birchington-on-Sea, near Margate, he died there April 9, 1882.

The poetry of Rossetti is intense in feeling, exalted in tone, highly individual in personal gift, picturesque and sometimes pictorial in treatment, and elaborately wrought in literary form. These characteristics are sometimes made consistent with simplicity, but more generally with subtlety, of emotion or of thought. As in his paintings, there is a strong mediæval tendency. It is now generally allowed that Mr. Buchanan's charges of immorality against the writings were wide of the mark; indeed, he himself has admitted and proclaimed as much. Rossetti was intimate at one or other period of his life with many of the best men of the day. In politics he took no part. His religious views were vague—at times negative enough; but he had a strong sense of reverence, and a tendency to superstition rather than distinct faith. In person he was of middling height, with a handsome, expressive physiognomy, more Italian than English. His portrait, a pencil-drawing executed by himself toward the age of 18, is in the National Portrait Gallery. He was generous, unthrift, warm-tempered, clear-headed but not discursive in habit of mind, very natural and unaffected in manner, concentrated in aims and modes of work. In almost all companies in which he mixed he assumed and preserved a marked ascendancy, due to his exceptional faculty and uncompromising tone of mind and character.

WILLIAM MICHAEL, an English poet and art critic; born in London, England, Sept. 25, 1829; brother of Dante Gabriel. He entered the excise office in 1845, and was assistant secretary of the Board of Inland Revenue in 1869–1894. He was the author of "Dante's Comedy—The Hell, Translated into Literal Blank Verse" (1865); "Poems and Ballads: A Criticism" [of Swinburne] (1866); "A Life of Percy Bysshe Shelley" (1869); and "Life of John Keats" (1887). He edited the works of many poets.

Rossi, Ernesto (rōs'ē), an Italian actor and dramatist; born in Leghorn, Italy, in

1829. He studied law originally. Though known chiefly as an actor, he wrote several plays, including "Adèla"—a drama for Mme. Ristori, with whom he appeared—"The Hyenas," a social comedy, and "The Soldier's Prayer"; also a treatise on "Hamlet"; "Dramatic Studies" (1882); "Forty Years of Artistic Life," a collection of historical essays and personal recollections; and "Niccolai" (1887–1890). He retired from the stage in 1889 and died in Rome, June 4, 1896.

Rossini, Gioacchino Antonio, one of the most popular, and perhaps the greatest Italian composer of operas; born in Pesaro, Italy, Feb. 29, 1792. His parents belonged to a strolling opera company, and he began his career by playing second horn to his father when he was only 10 years old. Having a fine voice, his father had him taught singing by an eminent professor, and he took the treble parts as a chorister in the Bologna churches, and soon became an excellent singer and accompanist. The breaking of his voice put an end to his occupation as a chorister, and at the age of 15 he was admitted into the Lyceum at Bologna, and received lessons in counterpoint from Padre Mattei. But his ardent nature turned restive under the strict discipline and dry studies of Mattei, and, conscious of the possession of genius, he set to work assiduously to educate himself—studying intently the best models, Italian and German. He produced some light operatic pieces, the only one of which juvenile efforts that has lived is the "Lucky Trick," which came out in 1812. "Tancred," brought out at Venice in 1813, when he was scarcely more than 20 years of age, all at once made his name famous. Thus encouraged, Rossini produced a number of other works in quick succession, generally inferior to the work which brought him into popularity. In 1816 he produced his world-famous "Barber of Seville" at Rome. Those of his other works which still keep the stage are: "Othello," "Moses in Egypt," "Semiramide," "The Pilfering Magpie," "The Lady of the Lake," "Count Ory," and "William Tell." This last, the greatest and most original of his works, was written at the age of 37, and with it closed the career of Rossini as a composer. After holding the post of manager of the Italian Opera at Paris during some time, he, in 1836, returned to his native country, where he continued to reside till 1856, when he repaired to Paris once more. He seemed, however, to have totally forgotten the enthusiasm of his younger days for music; even so far as never to visit the theaters. His only important work since the production of "William Tell" is his well-known "Stabat Mater." He died in his villa in Passy, near Paris, Nov. 13, 1868.

Rossiter, Thomas Pritchard, an American artist; born in New Haven, Conn., Sept. 29, 1817; early developed a talent for painting and began the study of art under G. Jocelyn, of New Haven. He studied in Rome in 1840-1846, and on his return opened a studio in New York city. He became an Academician in 1849. In 1860 he removed to Cold Spring, N. Y., where he resided till his death. He devoted himself to historical and scriptural subjects, and possessed admirable taste as a colorist. At the Universal Exhibition of 1855 he received a gold medal for his "Venice in the 15th Century," and at the Paris salon of the same year he was awarded a medal of the third class. He died in Cold Spring, N. Y., May 17, 1871.

Rost, John Christopher, a German poet; born in Leipsic, April 7, 1717. He made a reputation by his lively satires against the Saxon school; particularly the one entitled "The Prelude" (1742: a sort of epic satire in five songs), and "The Devil's Epistle" (1754). He also wrote many pastorals, among them being "Learned Love" (1742), the grace of which equals its licentiousness; a collection of "Letters" (1766); and "Various Poems" (1769). He died in 1765.

Rostan, Joseph André de, a French dramatist; born in Constantinople, Turkey, Sept. 13, 1819. He wrote, either in French or in Spanish, "Egill the Demon" (1847), a lyric drama; "The Last Troubadour"; "The Daughter of Voltaire" (1859); "In the Kneading Trough" (1866); besides vaudevilles, librettos of operas, verse, romances, and critical articles. He himself undertook the publication of his "Works: French and Spanish" (1863).

Rostand, Edmond, a French poet; born in Marseilles, France, in 1868; was educated in Paris; and in 1894 his first play "The Romanticists" was produced at the Comedie Française. It was an instantaneous success and was followed by "Princess Lontaine" (1896); "The Samaritan" (1897); "Cyrano de Bergerac" (1898); and "L'Aiglon" ("The Eaglet," 1900). The last two were translated into English and played in the United States by Richard Mansfield and Maude Adams; and in 1901 Coquelin and Sarah Bernhardt, the leading French actor and actress, presented the original versions in the United States. Rostand's versification is of remarkable beauty. On May 30, 1901, he was elected one of the 40 "immortals" of the French Academy. He was the youngest candidate ever elected.

Rostand, Joseph Eugène Hubert, a French poet and littérateur; born in Marseilles, France, June 23, 1843. The following collections of poems made his reputa-

tion: "Sketches" (1865); "The Second Page" (1866); "Simple Poems" (1874); "The Paths of Righteousness" ("Les Sentiers Unis": 1886); and the poems of Catullus translated into French verse (1880). He has also published: "Questions of Social Economy in a Great City" (1889); "A Visit to Some Bureaus of Information in Italy" (1891); and others.

Roster, in military language, a term implying the seniority list from which officers are detailed for duty in regular succession; hence, occasionally, a list showing the turn or rotation of service or duty, as in the case of military officers and others who relieve or succeed each other.

Rostopchine, Feodor Vassilievich, Count, a Russian general; born in the province of Orel, Russia, March 23, 1763. Entering the Russian military service as a lieutenant in the Imperial Guard, he won great influence over the weak mind of the Emperor Paul, who promoted him to various offices in rapid succession. In May, 1812, the Emperor Alexander appointed him governor of Moscow. He it was, according to the French writers, who planned and began with his own hand the burning of Moscow. But in 1823 he published "The Truth about the Burning of Moscow" (Paris, 1823), in which he rebuts the charge, affirming that this action was due in part to a few of the inhabitants, and in part to the violence and negligence of the French. Nevertheless, he subsequently recalled this denial and admitted his share in the burning, in that he at least set fire to his own mansion house. His works, which include a number of historical memoirs, two comedies, etc., in Russian and French, were published at St. Petersburg in 1853. He died in Moscow, Jan. 30, 1826.

Rostrum, plural **Rostra**, a scaffold or elevated platform in the Forum at Rome, from which public orations, pleadings, funeral harangues, etc., were delivered; so called from the rostra or beaks of ships with which it was ornamented. Also a pulpit, platform, or elevated place from which a speaker, as a preacher, an auctioneer, etc., addresses his audience.

Rot, a disease in sheep and other gramivorous animals, produced by the hydatids *Fasciola hepatica* and *Distoma lanceolatum*, often living in great numbers in the gall ducts, and bladder of the animal. The latter parasite has been detected in the human subject.

Rota Romana, the highest ecclesiastical court of appeal for all Christendom during the supremacy of the Popes. With the dwindling temporal power of the Popes it gradually lost all authority in foreign countries.

Rota, Vincent (rō'tä), an Italian littérateur; born in Padua, Italy, in 1703. He wrote a great number of theatrical pieces, remarkable for their facility of expression and their witty but not unkind satires; including "The Dead Alive," "The Icy Shepherd," and "The Fantasm." He also wrote "The Conflagration of the Time of St. Anthony of Padua: A Tale" (1749), in imitation of Boccaccio; and many dialogues and epistles in Latin. He died in Padua in 1785.

Rotalier, Charles Edouard Joseph, a French historian and publicist; born in Villerspoz, near Colombier, in 1804. He began his literary career with two romances, "The Captive of Barberousse" and "The Daughter of the Dey," suggested by his sojourn in Africa in command of a regiment. But he soon abandoned fiction for more serious work, and wrote the "History of Algiers," a strong and brilliant production, still considered an authority on the subject; and "France and her Relations with Europe," a work which at once placed him in the highest rank of the publicists of his day. He died July 21, 1849.

Rotanev. See SUALOCIN.

Rotation, in astronomy, the turning round of a planet on its imaginary axis, like that of a wheel on its axle. In the infancy of astronomy it was assumed that the earth was at rest, and that the sun and stars moved round it from E. to W. After note had been taken of the fact that when a boat is gently gliding along a canal or tranquil lake, the sensation to one on board is as if the boat was stationary, and the objects on the bank moved past in the opposite direction, a second hypothesis became worth consideration, viz., that the apparently stationary earth might be like the moving boat, and the heavens resemble the really stationary bank. It gathered strength when it was considered that the earth was not a sphere but an oblate spheroid, as if rapid whirling had bulged it out at the equator, that Jupiter was yet more flattened at the poles than the earth, and that the direction of the trade winds, cyclones, etc., seemed the result of rotation. In 1851 Foucault completed the proof by making visible to the eye that a pendulum with a very long string alters its direction in a way which cannot be accounted for except by rotation (see GYROSCOPE). The rotation of the earth is performed with a uniform motion from W. to E. and occupies the interval in time which would elapse between the departure of a star from a certain point in the sky and its return to the same point again. The only motions which interfere with its regularity are the precession of the equinoxes and nutation (see PRECESSION: NUTATION). The time taken for the rota-

tion of the earth measures the length of its day. So with the other planets. The sun also rotates as is shown by the movement of spots across its disk (see SUN). The earth's rotation slightly increases the force of gravity in moving from the equator to the poles. Sir William Thomson reasoning from some small anomalies in the moon's motion, inferred that 10,000,000 years ago the earth rotated one-seventh faster than it does now, and that the centrifugal force then was to that now as 64 to 49.

In botany, a rotary movement of a layer of protoplasm, investing the whole internal surface of a cell, as well seen in Chara, etc. It was first investigated by Corti in 1774. Called more fully intercellular rotation. In physiology: (1) The movement of a bone round its axis, without any great change of situation. (2) The moving of the yolk in an ovum at a certain stage of development on its axis in the surrounding fluid. This was first observed by Leeuwenhoek in 1695.

Rotation of Crops, the cultivation of a different kind of crop each year, for a certain period, to prevent the exhaustion of the soil. If a plant requiring specially alkaline nutriment be planted year after year in the same field or bed, it will ultimately exhaust all the alkalies in the soil and then languish. But if a plant be substituted in large measure requiring siliceous elements for its growth, it can flourish where its alkaline predecessor is starved. Meanwhile the action of the atmosphere is continually reducing to a soluble condition small quantities of soil, thus restoring the lost alkalies. Manure will replace lost elements more quickly. The period of rotation is often made four years. By the neglect of rotation soils in parts of Sicily, Asia Minor, Campania, and Spain, which were once highly productive, are now barren.

Rotgans, Lucas, a Dutch poet; born in Amsterdam in October, 1645. He wrote an epic poem of great merit, in eight cantos, of which the hero is William of Orange (William III. of England); two tragedies, "Æneas and Turnus" and "Scylla," played with great success for a long time; "The Parish Feast," a descriptive poem in two songs; and "Miscellaneous Poems." He died in Kromwyck, Nov. 3, 1710.

Rothe, Richard, a German theologian; born in Posen, Prussia, Jan. 28, 1799. From 1823 till 1828 he was chaplain to the Prussian embassy at Rome. He afterward held various professorial posts at Wittenberg (1828-1837), Heidelberg (1837-1849), and Bonn (1849-1854), and finally returned to Heidelberg. The work upon which his fame principally rests is his "Theological Ethics," a complete system of speculative the-

Rotherham

ology, published in 1845-1848 (2d ed. 1867-1871), occupying a middle position between the rationalistic and orthodox schools of theology. According to Rothe the rational man is developed by the processes of animal evolution, but spirit is a super-physical development. He died in Heidelberg, Aug. 20, 1867.

Rotherham, a manufacturing town in the West Riding of Yorkshire, England, on the Don, here joined by the Rother; 5 miles E. N. E. of Sheffield. Its chief glory is the magnificent cruciform church, Perpendicular in style, with crocketed spire and fine W. front. It is probably somewhat earlier than its reputed founder, Thomas de Rotherham, Archbishop of York (1423-1500); in 1875 it was restored by Sir G. G. Scott at a cost of \$45,000. A handsome edifice in the Collegiate Gothic style, built for an independent college in 1875 at a cost of \$130,000, has been bought for \$40,000 and applied to the purpose of a grammar school (1843), at which Bishop Sanderson was educated. There are also a mechanics' institute (1853); a free library (1881); an infirmary (1870); a covered market (1879) public baths (1887); a park (1876) of 20 acres, 300 feet above the town; and the Clifton Park of 57 acres, which, costing \$12,000, contains a fine mansion house, and was opened by the Prince of Wales on June 25, 1891. The manufactures include stoves, grates, chemicals, pottery, glass, railway carriages, etc. Ebenezer Elliott was a native of the suburb of Masborough, which is included within the municipal boundary, incorporated in 1871. Roche Abbey, a ruin, 8 miles E. S. E., was a Cistercian foundation (1147); and 8 miles N. E. is Conisborough Castle. Pop. (1901) 54,349.

Rothschild (red shield), the name of a Jewish family of European bankers and capitalists, the enormousness of whose aggregate wealth has passed into a proverb. The founder of this race of financiers, MEYER ANSELM ROTHSCILD, born at Frankfort-on-the-Main in 1743, died there in 1812, after having accumulated the most gigantic fortune ever possessed by a single individual up to his day. Commencing the world as a small trader, he, by his probity, frugality, and superior business qualifications, eventually became the banker of monarchs and the creditor of states. Of the five sons who succeeded to the vast inheritance he bequeathed them, the eldest, ANSELM (born 1773, died 1855), was his father's partner and successor at Frankfort. The second, SOLOMON (born 1774, died 1855), became established as the representative of the house of Rothschild at Vienna. The third, NATHAN MEYER (born 1774, died 1836), settled as the London partner, and became the leading member and ablest

Rotteck

financier of the family. The fourth, CHARLES (born 1788, died 1855), filled the representation of the firm at Vienna. Lastly, JAMES (born 1792, died 1869), eventually took up his residence in Paris, where he died, leaving a fortune estimated at \$200,000,000. Within a period of less than 12 years the Rothschilds advanced in loans as follows: to England, \$200,000,000; Austria, \$50,000,000; Prussia, \$40,000,000; France, \$80,000,000; Naples, \$50,000,000; Russia, \$25,000,000; Brazil, \$12,000,000; besides some \$5,000,000 to smaller States; or, altogether, the almost incredible amount of \$462,000,000. The colossal financiering operations of the house are now conducted by the sons of the above-mentioned brothers, and the firm has banking houses and representatives in all the leading cities of the civilized world.

Rotifera, in zoölogy, wheel-animalcules; a group of Metazoa which have been variously classified. Ehrenberg arranged them according to the peculiarities of their trochal disks, and Dujardin according to their methods of locomotion. They are now often made a class of Vermes, with four families, *Philodinidæ*, *Brachionidæ*, *Hydatinæ*, and *Floscularidæ*. They are microscopic animals, contractile, crowned with vibratile cilia at the anterior part of the body, which, by their motion, often resemble a wheel revolving rapidly. Intestine distinct, terminated at one extremity by a mouth, at the other by an anus; generation oviparous, sometimes viviparous. The nervous system is represented by a relatively large single ganglion, with one or two eye-spots, on one side of the body, near the mouth, and there are organs which appear to be sensory. They are free or adherent, but never absolutely fixed animals.

Rotrou, Jean, a French dramatist; born in Dreux, France, Aug. 21, 1609. He was but 19 when his first piece was played: it was "The Hypochondriac" (1628), a tragic-comedy in five acts. His chef d'œuvre is "Venceslas," a tragedy founded on the Spanish play of Francesco de Rojas, "One Cannot be Both Father and King." He produced a great number of other plays, the finest of which are "St. Genest," "Don Bertrand de Cabrère," and "Cosroës." He died June 27 or 28, 1650.

Rotteck, Karl Wenzeslaus Rodecker von, a German historian; born in Freiburg, Baden, July 18, 1775. His "Universal History" (1813-1827), and its minor compendium, "Universal History of the World" (1830), exercised a great and beneficial influence upon the middle classes of Germany. Both books have been often reprinted and translated into several languages. He died in Freiburg, Nov. 26, 1840.

Rotten Stone

Rotten Stone, or **Tripoli**, a mineral consisting chiefly of alumina, with about 10 per cent. of carbonaceous matter and a little silica. It is supposed to be formed by decomposition of shale. It is found near Albany, N. Y. It is brown; either grayish, reddish, or blackish. It is soft, and easily scraped to powder, and is well-known to housewives, being much used for cleaning and polishing brass and other metals.

Rotterdam, the chief port and second city of Holland; on the Nieuwe Maas or Meuse, at its junction with the Rotte; about 14 miles from the North Sea, with which it is also directly connected by a ship canal (Nieuwe Waterweg) admitting the largest vessels and not interrupted by a single lock. The town is intersected by numerous canals, which permit large vessels to moor alongside the warehouses in the very center of the city. These canals, which are crossed by innumerable drawbridges and swing bridges, are in many cases lined with rows of trees; and the handsome quay on the river front, $1\frac{1}{4}$ miles long, is known as the Boompjes ("little trees"), from a row of elms planted in 1615 and now of great size. Many of the houses are quaint edifices, having their gables to the street, with overhanging upper stories. The principal buildings are the town hall, court houses, exchange, old East India House, Boymans' Museum, containing chiefly Dutch and modern paintings, and the government dockyards and arsenal, besides the numerous churches, of which the most conspicuous is the Groote Kerk, or Church of St. Lawrence (15th century). The Groote Markt has a statue of Erasmus, a native of the town; and there are fine parks and a large zoölogical garden. Rotterdam contains ship-building yards, sugar refineries, distilleries, tobacco factories, and large machine works; but its mainstay is commerce. It not only carries on a very extensive and active trade with Great Britain, the Dutch East and West Indies, and other transoceanic countries, but, as the natural outlet for the entire basin of the Rhine and Meuse, it has developed an important commerce with Germany, Switzerland, and Central Europe. The Maas is crossed by a great railway bridge and another for carriages and foot-passengers. Rotterdam received town rights in 1340, and in 1573 it obtained a vote in the Estates of the Netherlands; but its modern prosperity has been chiefly developed since 1830. Pop. (1906) 379,017.

Rotti, an island in the Indian Archipelago, belonging to the Dutch; S. W. of Timor. It is 36 miles in length (655 square miles), and has a pop. of 60,000. The surface, though hilly, is nowhere more than

Rouen

800 feet above the sea, and the fertile soil produces a rich vegetation.

Rottlera, a genus of *Euphorbiaceæ*. *R. tinctoria* is a tree very common in India, and occurring also in the Indian Archipelago, Australia, and Arabia. The three-lobed fruit is covered with a red mealy powder called in India kamala. As people in India occasionally paint their faces with the red powder, the tree itself is sometimes called the monkey's face tree. It is used in the N. W. provinces of India for tanning leather. It yields a clear limpid oil, useful as a cathartic.

Rotumah, an island in the South Pacific, annexed to the Fiji Islands by Great Britain in 1881; distant about 300 miles N. N. W. from the nearest island of that group, of which it is a dependency; area, 14 square miles; pop. 2,300, all Christians.

Roubaix, a town of France, in the department of Nord; 6 miles N. E. of Lille; is a highly important seat of the French textile industry, remarkable for its rapid growth, most of it being not more than 50 years old. Woolens, cottons, and silk or mixed stuffs are chiefly made; also beet sugar, machinery, etc. Pop. (1906) 121,017.

Roubillac, Louis François, a French sculptor; born in Lyons, France, in 1695. He settled in England in the reign of George I. In the dearth of native talent which prevailed at that period he long stood at the head of his profession. He executed a number of monuments in Westminster Abbey, the most remarkable being that of Mrs. Nightingale. He also produced statues of Handel, Shakespeare, Sir Isaac Newton, George II., and a large number of portrait busts. He had much skill in portraiture, but his figures are often marred by striving after dramatic effect. He died in London, England, in 1762.

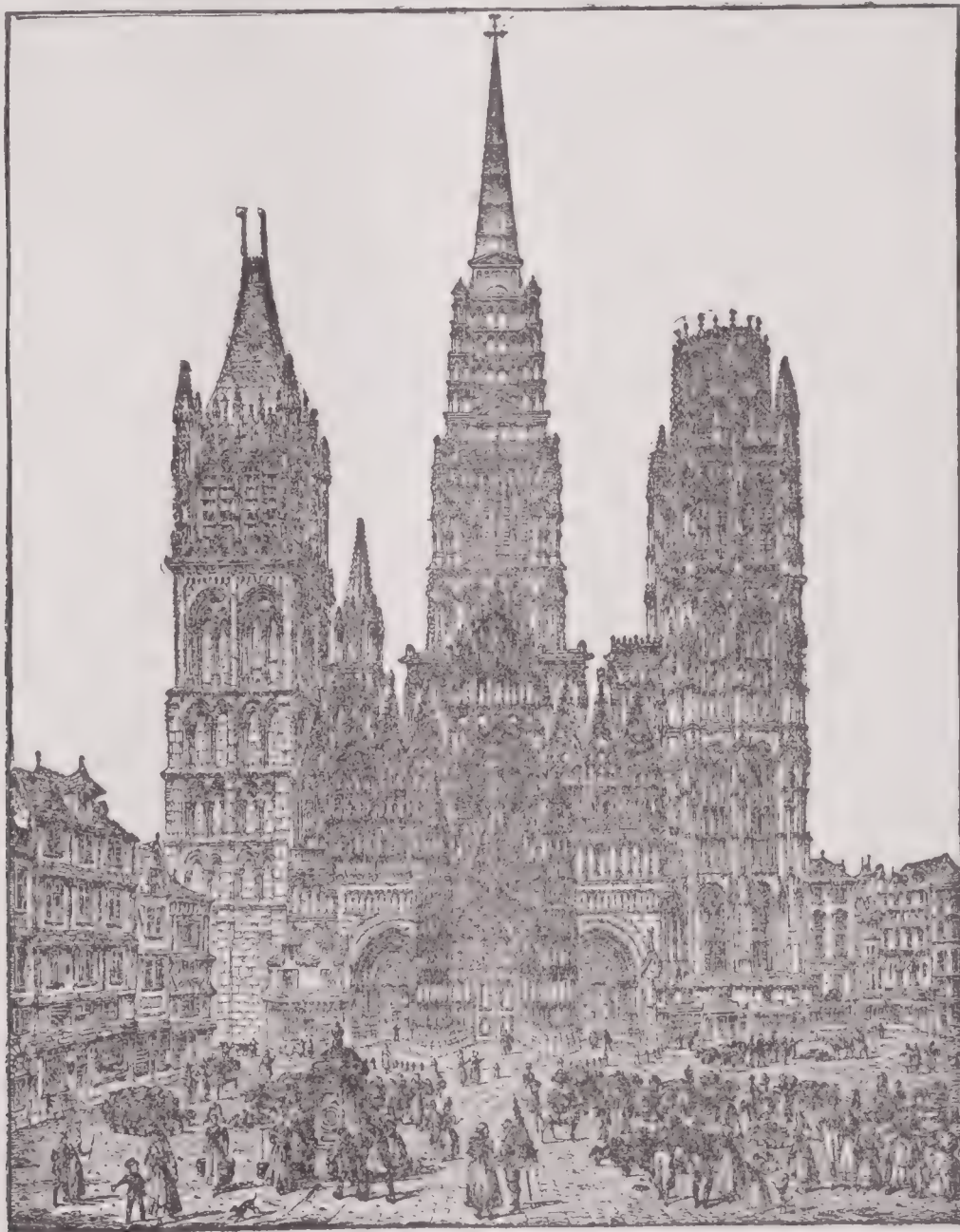
Rouble, the unit of the Russian money system. The present silver rouble is equivalent to about 80½ cents in United States gold. Half and quarter roubles are coined in silver, also gold coins of nominally five roubles (demi-imperials) and three roubles (imperial ducats). There is, however, little coined money in circulation; it is nearly all paper, notes of the values of 1, 3, 5, 10, 25, and 100 roubles. A paper rouble is worth about 49 cents. The rouble is divided into 100 kopeks.

Rouen, a city of France, capital of the department of Seine-Inférieure, and formerly of the province of Normandy, on the Seine, 44 miles from its mouth, and 67 N. W. of Paris. It is situate on the right bank of the Seine, in a fertile, pleasant, and varied country. The streets, though in general straight, are narrow and dirty, and some of the houses are of wood. The

most agreeable part of the town is that which adjoins the Seine. The public buildings of interest are, the cathedral, containing many old monuments, and one of the finest specimens of Gothic architecture in France; the Church of St. Ouen, likewise a fine Gothic building, situate nearly in the center of the town; and that of St. Maclou, considered a master-piece of its kind. There are two bridges over the Seine, one of stone, another of iron, connecting the town with the suburb of St. Sever; also various literary societies and schools, an academy of

here. A statue to her memory has been erected on the spot. It is the birthplace of the two Corneilles, and of Fontenelle and Boieldieu. Pop. (1906) 118,459.

Rouge, in ordinary language, a cosmetic prepared from the dried flowers of *Carthamus tinctorius*, and used to impart artificial bloom to the cheeks or lips. It is applied by means of a camel's hair pencil, puff-powder, or a hare's foot. (The last method is chiefly used in theatrical making-up). When rouge is properly prepared, it is said that its application does not injure



ROUEN CATHEDRAL, WEST FACE.

belles-lettres, a society of agriculture and the arts, a central school, classes for medicine and surgery, a navigation and drawing school, together with a public library, a collection of paintings and natural history and a botanical garden. Manufactures cotton goods, woolens, linens, iron ware, paper, hats, pottery, wax, cloth, and sugar refineries. Dyeing, both of woolens and cotton, is also conducted with care and success. Rouen has frequently been taken and retaken. In 1418 it was taken by Henry V., and Joan of Arc was, in 1431, burned

the skin. Jeweller's rouge: An impalpable preparation of oxide of iron, obtained by gently heating the yellow oxalate of iron till it decomposes, carbonic acid escaping, and only a red powder being left. It is used for polishing silver, and for this purpose should be of the finest quality. Many cheaper varieties are sold under this name.

Rouge et Noir (French, "red and black"), TRENTE-UN ("31"), or TRENTE ET QUARANTE ("30 and 40"), a modern game of chance, played by the aid of packs of cards on a table covered with green

cloth. The table is of a form similar to that shown in the figure. It is divided into four portions, each marked in the center with a diamond, the diamonds being alternately red and black; and these quarters are further separated, two and two, by bands which cross the table at its narrowest part. At the end of the table are a series of concentric bands painted of a yellow color (not represented in the fig-

stake his money on some one of the four chances, denominated noir, rouge, couleur, and l'inverse, which will be afterward explained.

After the stakes have been laid on the table (those for the noir being laid on either of the quarters marked with a black, and those for the rouge on either of the quarters marked with a red diamond, those for the "couleur" on one of the transverse



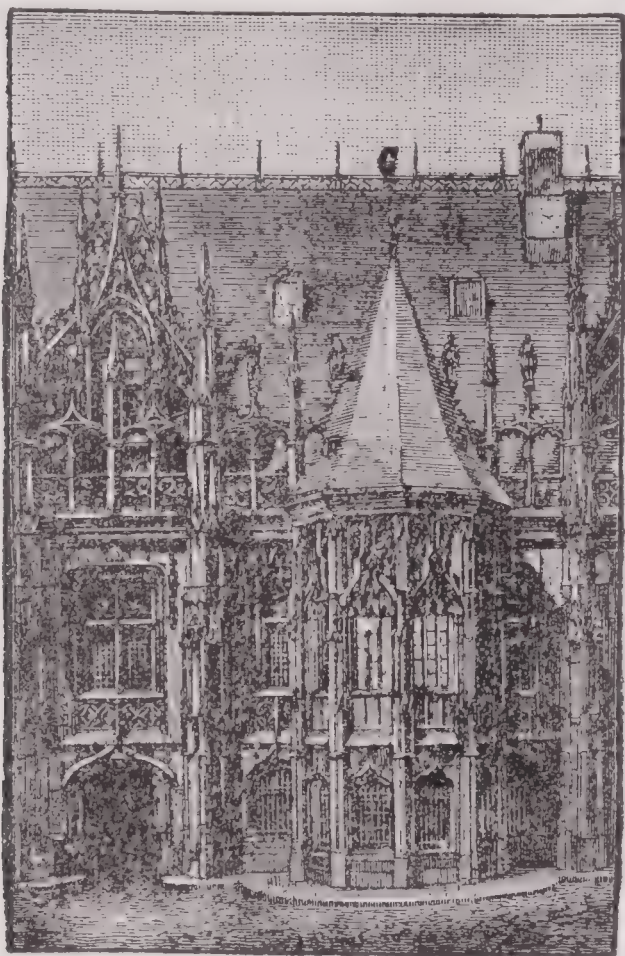
ROUEN CATHEDRAL, FRONT.

ure). The game is played as follows: one of the *tailleurs* (or dealers, who manage the table, take charge of the bank, and keep an eye on the players) takes up his position at one side of the table, opposite to the *croupier* (another *tailleur*), and unseals, in the presence of the players, six packs of cards, which are first counted, then shuffled by several *tailleurs*, and returned to the first *tailleur*, who presents them to one of the players to be cut. This is performed by the insertion of a blank card in any part of the pack, which is then adjusted, and the game proceeds. Each player must

bands, and those for the "inverse" on one of the yellow circles at the end of the table), the *tailleur* takes a handful of cards from the top of the pack, and deals first for the noir, taking one card after another from the top of the handful and placing them on the table side by side, till the number of pips on them amounts to more than 30 when he stops. He then deals out another row in a similar manner for the rouge, till, as before, the number of pips amounts to more than 30. In reckoning the number of pips, the ace is counted as one, the other plain cards according to the

Rouge et Noir

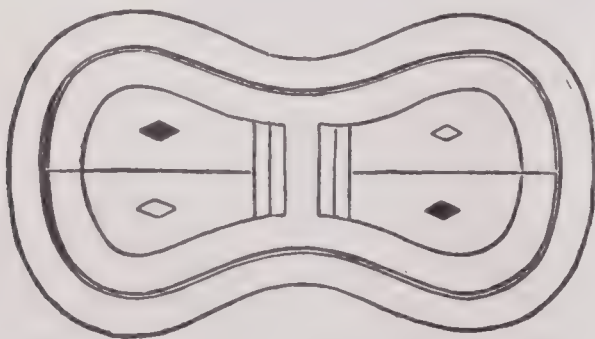
number of pips, and the court-cards 10 each. It will thus be seen that the number to which each of the two rows of cards amounts, must be more than 30 and not more than 40. If the value of the first row is nearer 31 than that of the second, then the first row, or noir, wins; if the contrary is the case, then the second row, or rouge wins.



ROUEN: PALACE OF JUSTICE.

Couleur wins if the first card tabled by the *tailleur* is of the winning color—for instance, if the first card laid down is a “spade” or “club,” and if noir wins; but if the first card dealt be not of the winning color, then inverse wins, and couleur loses.

Two (and no more) of the four chances can be winning chances at one time; and the winning players have their stakes increased by an equal sum from the bank, and



ROUGE ET NOIR.

then withdraw their stake and winnings, while the stakes of the losers are raked by the *tailleurs* to the bank in the center of the table. When the value of the first, or noir row, is equal to that of the second,

Rough Riders

or rouge row, it is a *refait*, and the dealer must commence to deal anew from the cards remaining in his hand; when the *refait* occurs the player may either withdraw his stake, or stake on a different chance, with the same or more or less money as he thinks proper. The game would be an even one between the players and the bank were it not for the following regulation: When the points dealt for the noir and the rouge each amount to 31 (“*un refait de trente-et-un*”) the half of all the stakes on each of the chances belongs to the bank, and this the players may either pay or have their stakes “put in prison,” the next deal determining whether they shall belong to the bank or be restored to the player. If a second doublet of 31 occurs in the deal immediately succeeding, the stakes which were in prison are diminished by one-half, which goes to the bank, and the other half is “put into the second prison,” from which it requires two successive winnings of the player to regain them. The chance of “*un refait de trente-et-un*” is about once in 64 deals. This game superseded *faro* and *biribi* in France about 1789, but along with roulette was forbidden by law in 1838.

Rougemont, Michel Nicolas Balisson de, a French author; born in La Rochelle, France, in 1781. His dramatic compositions are almost innumerable. The most remarkable are: “The Supposed Husband” (1806); “The Supper of Henry IV.” (1810); “The Marriage of Charlemagne” (1811); “The Fête of Henry IV.” (1826). Among his many other poems, romances, and *feuilletons* are: “The Return of the Hero” (1805), a poem; “Song-Book of the Bourbons” (1814); “Bonhomme; or, Observations on Parisian Manners and Customs at the Beginning of the Nineteenth Century” (1818); “The French Rover” (1816–1822); and “Spain Delivered” (1823). He died in July, 1840.

Rouget de Lisle, Claude Joseph, a French song-writer; born in Lons-le-Saulnier, France, May 10, 1760. He composed both words and music of “The Marseillaise,” when he was an officer of engineers at Strasburg on the night of April 25, 1792. It first appeared under the title of “Song of the Army of the Rhine.” He wrote several other fragments of songs, included in his “Fifty French Songs, Words of Various Authors, Set to Music by Rouget de Lisle” (1825); and other poems, stories, and plays, of but little merit. He died in Choisy-le-Roi, June 26 or 27, 1836.

Rough Riders, a name coined by William F. Cody (“Buffalo Bill”) for use in his “Wild West” show, which included a “Congress of the rough riders of the world.” The first rough riders were the men who carried messages over the West in the early

Roulette

frontier times before the pony express was organized in 1859. In the army the original rough riders were the 1st Regiment of United States Volunteer Cavalry, organized for the war with Spain by Surgeon Leonard Wood, who was commissioned colonel, with Theodore Roosevelt as lieutenant-colonel. The name was applied also to the 2d United States Volunteer Cavalry. The name was given to these regiments on account of their being composed largely of Western ranchmen. See ROOSEVELT, THEODORE; WOOD, LEONARD.

Roulette (French, "a little wheel"), a game of chance which from the end of the 18th century till the beginning of 1838 reigned supreme over all others in Paris. It continued to be played at German watering places till 1872, when it ceased in terms of an act passed four years before. Roulette then found a home at Monaco. It is played on a table of an oblong form, covered with green cloth, which has in its center a cavity of a little more than two feet in diameter, in the shape of a punch bowl. This cavity, which has several copper bands round its sides at equal distances from each other, has its sides fixed, but the bottom is movable round an axis placed in the center of the cavity, the handle by which motion is communicated being a species of cross or capstan of copper fixed on the upper extremity of the axis. Round the circumference of this movable bottom are 38 holes, painted in black and red alternately, with the first 36 numbers, and a single and double zero; and these 38 symbols are also figured at each end of the table in order that the players may place their stakes on the chance they select. Along the margin of the table and at each end of it are painted six words—pair, passe, noir, impair, manque, rouge, which will be afterward explained. Those who manage the table and keep the bank are called *tailleurs*.

The game is played as follows: One of the *tailleurs* puts the movable bottom in motion by turning the cross with his forefinger, and at the same instant throws into the cavity an ivory ball in a direction opposite to the motion of the bottom; the ball makes several revolutions, and at last falls into one of the 38 holes above mentioned, the hole into which it falls determining the gain or loss of the players. A player may stake his money on 1, 2, or any of the 38 numbers (including the zeros), and show what number or numbers he selects by placing his stake on them; if he has selected a number or zero corresponding to the one into which the ball falls, he receives from one of the *tailleurs* 36 times his stake—viz., his stake and 35 times more—if he selected only 1 number, 18 times if 2 numbers, 12 times if 3 numbers, etc. The blank rectangles at the bottom of each of the

Roumieux

three columns of numbers figured on the table are for the reception of the stake of that player who selects a column (12 numbers) as his chance, and if the ball enters a hole the number of which is found in his column, he is paid three times his stake.

Those who prefer staking their money on any of the chances marked on the edge of the table, if they win receive double their stake (their stake and as much more), and under the following circumstances: The "pair" wins when the ball falls into a hole marked by an even number; the "impair," if the hole is marked odd; the "manque," if the hole is numbered from 1 to 18 inclusive; the "passe," if it is numbered from 19 to 36 inclusive; the "rouge," if it is colored red; and the "noir," if it is colored black. If the ball should fall into either of the holes marked with the single or the double zero, the stakes of those players who venture on the six chances last described are either equally divided between the bank and the players, or as is more commonly the case, they are "put in prison," as it is called, and the succeeding trial determines whether they are to be restored to the players or gained by the bank. Should it so happen that at this trial the ball again falls into one of the two holes marked with zeros, then half of the stakes in prison are taken by the bank, and the remainder are "put into the second prison," and so on. The *tailleurs* thus have an advantage over the players in the proportion of 19 to 18. The player who bets on the numbers labors under a similar disadvantage, for though the two zero-points do not affect him in the same way as the player who stakes on one of the other six chances, still (supposing him to bet on a single number) as the chances are 37 to 1 against him, he ought to receive 37 times his stake (besides the stake) when he does win, whereas he only receives 35 times that amount, a manifest advantage in favor of the bank in the proportion of 37 to 35.

Roumania. See RUMANIA.

Roumanille, Joseph, a French (Provençal) poet; born in Saint Remy, Bouches-du-Rhône, France, Aug. 8, 1818. He was one of the most popular authors of the Society of *Félibres*. Apart from his improvisations, for which he was noted, he produced: "Li Margarideto" (1847); "Le Campano Mountado" (1857); "Lis Oubreto" (1859); "Li Conte Provençau li Cascareto" (1884); and others. He died in Avignon, May 24, 1891.

Roumelia. See RUMELIA.

Roumieux, Louis, a French (Provençal) poet; born in Nîmes in 1829. Among his productions may be named: "Li Bourgadiero" (1852), a collection of satires in the Nîmois dialect; "Li Griseto" (1853);

Round

and "Quan vou Prendre dos Lèbre à la Fes n'en Pren Ges (1863), a comedy.

Round, in music, a short composition in which three or more voices starting at the beginning of stated successive phrases, sing the same music in unison or octave (thus differing from the canon).

Roundelay, a sort of ancient poem, consisting of 13 verses, of which eight are in one kind of rime and five in another. It is divided into couplets, at the commencement of the second or third of which the beginning of the poem is repeated, and that, if possible, in an equivocal or punning sense. Also, a song or tune in which the first strain is repeated. Also, the tune to which a roundelay was sung. Or a dance in which all joined hands in a circle.

Rounders, a game played by two parties or sides on a piece of ground marked off into a square or circle, with stations for a batter and bowler, and three goals or stopping places at equal distances from each other and the batter's station. The object of the batter is to strike the ball as far as possible away with a short bat held in one hand, so as to be able to make a complete circuit of the ground, passing through each goal, or as far as any one of the goals, before the ball is returned by one of the fielders. A complete circuit of the ground made at once counts a run. The batter is out if the ball, after being hit by him, is caught by one of the fielders, or if he is struck by the ball thrown by a fielder while running between any of the goals. Also a rock-boring tool having a cylindrical form and indented face.

Roundfish, the *Salmo (coregonus) quadrilateralis*. The specimen on which Sir John Richardson based his description was about 18 inches long. It is not highly prized for food.

Roundhead, a term applied by the Cavaliers or adherents of Charles I., during the Civil War of 1642, to the Puritans or adherents of the Parliamentary party, from their wearing their hair cut short, while the Cavaliers allowed their hair to fall onto their shoulders.

Round Robin, a name given to a protest or remonstrance signed by a number of persons in a circular form, so that no one shall be obliged to head the list. It is said to have originated in a usage of the French officers. The most memorable round robin in literary history is that sent by Burke, Gibbon, Sir Joshua Reynolds, Joseph Warton, and others to Dr. Johnson, requesting him to amend the epitaph for Goldsmith's monument, and suggesting that it should be written in English, not Latin. Johnson took it kindly, but told Sir Joshua, who carried it to him, that he would "never con-

Round Towers

sent to disgrace the walls of Westminster Abbey with an English inscription."

Round Table, Knights of the. According to tradition, there reigned in Britain, toward the end of the 5th century, a Christian king, the British Uther-Pendragon, who had for a counsellor a powerful, wise, and benevolent enchanter, named Merlin, who advised him to assemble all his knights distinguished for piety, courage, and fidelity toward him, at feasts about a round table, which should be sufficiently large to receive 50 knights, but at which at first only 49 should be seated, room being left for one yet unborn. This was Arthur, or Artus, son of the king by Igerna, whom the king, by the magic power of Merlin, was permitted to enjoy under the form of her husband. Merlin had exacted a promise that the education of the prince should be intrusted to him, and he accordingly instructed him in everything becoming a brave, virtuous, and accomplished knight. Arthur in due time occupied the empty seat at the Round Table; and under him it became the resort of all valiant, pious, and noble knights, admission to it becoming the reward of the greatest virtues and feats of arms. According to another account, Arthur himself established the Round Table at York. In the year 1344, Edward III., anxious to attract around him the most noble knights from all parts of Europe, proclaimed, as well in Scotland, France, Germany, Hainault, Spain, and other foreign countries, as in England, that he designed to revive the Round Table of King Arthur, offering free conduct and courteous reception to all who might be disposed to attend the splendid jousts to be held on that occasion at Windsor Castle. This solemn festival, which Edward purposed to hold annually, excited the jealousy of Philip de Valois, King of France, who not only prohibited his subjects to attend it, but proclaimed an opposite Round Table to be held by himself in Paris. In consequence of this interference the festival of Edward lost some part of its celebrity and splendor; and this induced the English monarch to establish the memorable order of the Garter. See ARTHUR: LANCELOT OF THE LAKE: MERLIN: MORTE D'ARTHUR: ROMANCE.

Round Towers, a class of tall narrow circular edifices, tapering somewhat from the base upward, and generally with a conical top, from 60 to 130 feet in height, and from 20 to 30 in diameter. With the exception of three in Scotland, they are peculiar to Ireland. The doors are from 6 to 20 feet from the ground, the windows small. The interior contained no stairs, but the successive stories were reached, like the doors, by means of ladders. Authorities are now pretty well agreed that these towers were the works of a Christianized race,

erected as places of refuge and as watch towers. They date from the 8th or 9th to the 13th century.

Roup, one of the most serious diseases which the poultry or pheasant keeper has to fight, because in it there is generally an affection other than the mere cold which develops and makes it apparent. It is usually found that the system is scrofulous, which is the milder form; but sometimes it takes a diphtheric development, and this is the most severe and deadly disease known to poultry keepers. Whether scrofulous or diphtheric, it is highly contagious, and very seldom is any bird in a yard attacked without nearly all the others being also affected. The difference between ordinary cold and roup is very easy to determine, though the symptoms are in some respects the same. But when it is merely cold the running at the eyes and nostrils is not at all offensive, whereas it is strongly so in the case of roup from scrofula, the breath being most repulsive. This fact, as well as the swelling of the face, may be taken at once to determine when it is roup. The cause may generally be sought for in bad feeding, housing, or ventilation, which have charged the blood with scrofulous matter, and the outward symptoms are induced by cold. When first noticed the birds affected should at once be isolated, in order to prevent the spreading of the disease, which will speedily follow if all are kept together. The treatment must be dual, namely to cure the cold and to remove the scrofula from the blood. For the former any of the roup pills sold can be used, or it may be removed by homœopathic tincture of aconite given three or four times a day, the birds being kept in a warm and draughtless place. The scrofula is not so easily eradicated and will require patience. Ordinary-sized pills made of powdered charcoal 10 parts, dried sulphate of iron 1 part, and capsicum 1 part, made up with butter, and given twice a day, form an excellent medicine when the roup proper in its more active state is removed. To do this, however, it is desirable to clear the mouth, nostrils, and eyes from the mucus which accumulates there and which will suffocate the bird if not removed. In milder cases it is enough to wash the parts with vinegar and water, but in more severe cases it is better to use solution of chlorinated soda, as it is much more effective. Should the nostrils be very full of mucus, a small bent syringe should be filled with the solution, which must be inserted into the slit in the bird's mouth, through which the liquid is forced, and will effectually clear the passages. It is most essential in returning the birds to the house again to see that they are entirely recovered. When diphtheric roup is present the matter assumes a more serious aspect, because of the

danger not only to other birds, but also to human beings, who have been known to contract this fell disease from birds. For that reason the greatest care must be taken, and, except in the case of very valuable fowls, it is much safer to kill those affected and bury them in quicklime. The outward symptoms in diphtheric roup are not nearly so apparent at first sight, because less prominent; still, the bird is noticed to be dull and lethargic. Unless checked the disease runs its course in a few hours, and the bird dies. Very often it is not known that diphtheric roup is present till several deaths have taken place. Its presence is easily distinguished by the skin-like substance formed over the throat. Treatment is doubtful, and Professor Whalley recommends that it should take the heroic form of dabbing the throat with carbolic acid, which will kill or cure.

Rouquette, Adrien. See ROQUETTE.

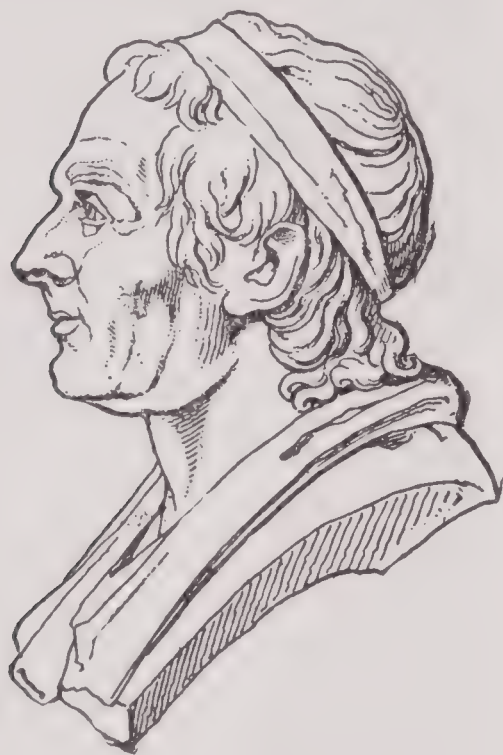
Rous, or Rouse, Francis, an English educator; born in Halton, Cornwall, England, in 1579; was educated at Oxford; became a member of the Long Parliament and of the Westminster Assembly of Divines; and was appointed provost of Eton in 1643. Conspicuous as a Puritan, he was also noted as the author of a version of the Psalms in meter, completed about 1646, and still in use in Scottish churches. He died in Acton, Jan. 7, 1659.

Rousay, or Rowsa, one of the Orkney islands, 4 miles long by 3 miles broad, between the island of Westray on the N., and Pomona on the S. It is hilly, with masses of heath in the center, but its shore land is quite fertile.

Rousseau, Jean Baptiste, a French poet; born in Paris, France, in April, 1670. He wrote a great number of odes, epistles, plays, allegories, songs, and epigrams; and though esteemed by his contemporaries "the prince of our lyric poets," is now looked on as a mediocre writer. He brought out an edition of his "Works" (1712); and many others have subsequently appeared. He died in Brussels, March 17, 1741.

Rousseau, Jean Jacques, a Swiss-French philosopher, one of the most celebrated and influential writers of the 18th century; born in Geneva, Switzerland, June 28, 1712. He was the son of a watchmaker. For the first 35 years of his life the chief authority is his own painfully frank, but perhaps not absolutely accurate "Confessions," first published in 1782 and 1789. His youth gave little promise of his future eminence, and after a desultory education he was apprenticed in 1725 to an engraver, from whose real or fancied severity he ran away in 1728. He now fell under the notice of Madame de Warens, a lady residing at Annecy, who sent him to a Roman Catholic institution at Turin, where he abjured Prot-

estantism. After several fits of eccentric wandering he went to live with Mme. de Warens at Les Charmettes, a country house near Chambéry, where they appear to have lived happily together for nearly three years. From a short absence at Montpellier, however, Rousseau returned to find his place at Les Charmettes occupied by another, whereupon he departed to become a tutor at Lyons. In 1741 he went to Paris, and in 1743 obtained the post of secretary to the French ambassador at Venice. This



JEAN JACQUES ROUSSEAU.

office he resigned, and returned to Paris in 1745, to lead a precarious life, copying music and studying science. About this time he became intimate with Diderot, Grimm, D'Holbach, Mme. D'Epinay, etc., and contributed to the "Encyclopédie"; and from this period also dated his connection with Thérèse le Vasseur, with whom, 25 years later, he went through some form of marriage ceremony. In 1750 his essay, in which he adopted the negative side of the question whether civilization has contributed to purify manners, won a prize offered by the Academy of Dijon, and brought him for the first time into general notice. In 1752 he brought out a successful operetta (the music by himself), and soon after a celebrated "Letter on French Music."

In 1754 he revisited Geneva, where he was readmitted a free citizen on once more embracing Protestantism. Having returned to Paris he wrote a sort of novel, "Julia, or the New Héloïse," which was published in 1760, being followed by "The Social Contract" (*Le Contrat Social*), a political work, and "Emile, or on Education," another story, in 1762. The principles expressed in these works stirred up much animosity against their author. The con-

fession of faith of the Savoyard vicar in Emile was declared a dangerous attack on religion, and the book was burned both in Paris and Geneva. Persecution, exaggerated by his own morbid sensibility, forced Rousseau to flee to Neuchâtel, then to the Ile St. Pierre in the Lake of Bienné, and finally to England, where he was welcomed by Hume, Boswell, and others in 1766. A malicious letter by Horace Walpole unluckily roused his suspicions of his English friends, and in May, 1767 he returned to France, where his presence was now tolerated. He lived in great poverty, supporting himself by copying music and publishing occasional works. In May, 1778, he retired to Ermenonville near Paris. His celebrated "Confessions" appeared at Geneva in 1782. Rousseau united an enthusiastic passion for love and freedom with an inflexible obstinacy and a strange spirit of paradox. His life was clouded by a gloomy hypochondria, often developing into suspicion of his truest friends, and embittered by an unreasonable sensitiveness, which some have described as almost actual insanity. The chief importance of his works lies perhaps in the fact that they contain the germ of the doctrines which were carried out with such ruthless consistency in the French revolution. Rousseau was also a musical author and critic of some importance. He died in Ermenonville, July 2, 1778, not without suspicion of suicide.

Rousseau, Pierre, a French dramatist; born in Toulouse, France, Aug. 19, 1716 or 1725. He brought ridicule on himself by assuming the title of "Rousseau of Toulouse" to distinguish himself from "Rousseau of Geneva." In collaboration with Favart, he published "A Coquette Without Knowing It" (1744), and "Mistakes" (1744), played with some success. He also wrote "The False Step" (1755), a novel; "History of the Card-Sharpers" (1758); and others. He died in Bouillon, Nov. 10, 1785.

Rousseau, Pierre Joseph, a French littérateur; born in Paris, France, in 1797. He wrote a number of vaudevilles in collaboration with others, signed for the most part with the pseudonyms "James Rousseau" and "Maxime James." Among them are: "The Lady of the Lake" (1825); "The Fairy of the Neighborhood" (1826); and "Love and Fear" (1827); also *Memoirs of my Creditors* (1828), and other miscellanies. He died in Paris in 1849.

Rousset, Camille Félix Michel, a French historian; born in Paris, France, Feb. 15, 1821. Among his published works are: "History of Louvois" (1861-1863); "The Volunteers of 1791-1794" (1870); "History of the Crimean War" (1877); and "Beginnings of a Conquest: Algiers

Roussette

from 1830 to 1840" (1887). He died in Saint Gobian, Aisne, France, Oct. 19, 1892.

Roussette, a name sometimes applied to the frugivorous bats generally.

Rove Beetles, or **Cocktails**, the popular name of certain beetles. The common species is the *Ocypus olens*, the black cocktail, or devil's coach horse. These beetles are carrion feeders.

Rovuma, a river of East Africa, which rises on the E. of Lake Nyassa, and flows nearly due E., with a course of about 500 miles, to the Indian Ocean. The Rovuma is not well adapted for navigation.

Roux, Amédée, a French littérateur; born in Billom, France, May 9, 1828. Besides a number of translations and the editing of the works of Voiture and letters of Count d'Avaux, he has published: "A Misanthrope at the Court of Louis XIV.: Montausier" (1860); "History of Italian Literature under the Régime of Unification" (1869-1883); and "Bird's-Eye View of Three Literatures" (1873).

Rowan, Andrew Summers, an American army officer; born in Gap Mills, Va.; was graduated at the United States Military Academy in 1881, and first came into prominence in 1898, when he was sent to communicate with General Garcia, after the declaration of the American-Spanish War. He landed from an open boat near Turquino Peak, Cuba, on April 24, 1898; marched through swamps and underbrush to the mountains, reached General Garcia, and successfully executed his mission, bringing back full information as to the insurgent army. For this act he was promoted to the rank of 1st lieutenant, U. S. A. After the war he was assigned to duty in the Philippine Islands.

Rowan, Stephen Clegg, an American naval officer; born near Dublin, Ireland, Dec. 25, 1808; came to the United States when a boy, and on Feb. 1, 1826, was appointed a midshipman in the navy. He was promoted lieutenant, March 8, 1837; took part in the capture of Monterey and San Diego in the Mexican war, and, as executive officer of the "Cyane," in the bombardment of Guaymas. In the battle of the Niesa, Upper California, he commanded the naval battalion under Commodore Stockton, and was especially commended for his skill in leading the landing party that made a successful attack on a Mexican outpost near Mazatlan. He was promoted commander Sept. 14, 1855. At the outbreak of the Civil War he was on the "Pawnee," with which he engaged the Confederate battery at Acquia Creek on May 25, 1861; this being the first naval action of the war. He was promoted both captain and commodore, July 16, 1862, for gallantry in the Goldsborough expedition to North Carolina, and

Rowe

the engagements on Roanoke Island and Albemarle Sound. He forced the surrender of the forts at Newbern, N. C., and by the capture of Fort Mason restored National authority in the waters of North Carolina. He commanded the "New Ironsides" in the engagements with Forts Wagner, Gregg, and Moultrie; received a vote of thanks from Congress; and was promoted rear-admiral, July 25, 1866. After the close of the war Rear-Admiral Rowan was appointed to various executive offices; was promoted vice-admiral Aug. 15, 1870; and was chairman of the Lighthouse Board at the time of his retirement, Feb. 26, 1889. He died in Washington, D. C., March 31, 1890.

Rowan Tree, or **Roan Tree**. See MOUNTAIN ASH.

Rowbotham, John Frederick, a Scotch miscellaneous writer; born in 1852. He resided in Germany several years, collecting material for his elaborate "History of Music" (1885); after which he turned his attention to the study of mediæval poetry, and published "The Death of Roland: An Epic Poem" (1887).

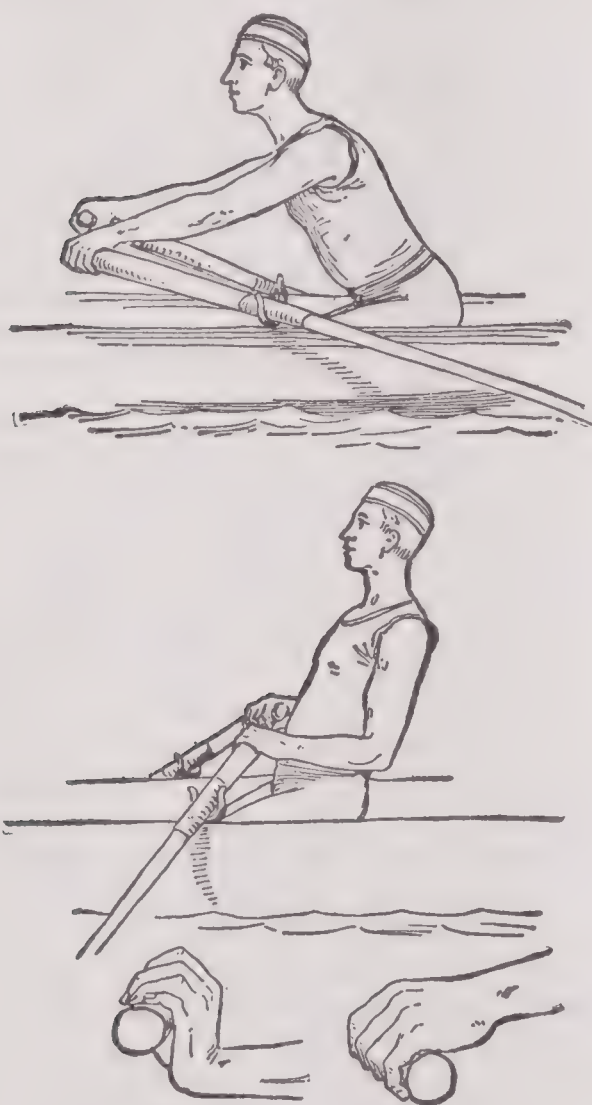
Rowe, George Fawcett, an English-American actor and playwright; born in Exeter, England, in 1836. He came to the United States from Australia in 1865. His first appearance on the American stage was at the Olympic Theater, New York, where in February, 1865, he appeared as D'Artagnan in the dramatizations of Dumas's "Three Musketeers," one of his best characters. He wrote the play "Geneva Cross," and appeared in "Brass," another of his productions, at the old Park Theater. His favorite character was that of Micawber in "Little Em'ly." He died in New York city, Aug. 29, 1889.

Rowe, Nicholas, an English dramatist and translator; born in Little Barford, Bedfordshire, England, June 30, 1674. He was educated at Westminster under Busby, and studied law in the Middle Temple; but early inheriting a small competency by the death of his father, he devoted himself to literature. Between 1700 and 1714 he produced eight plays, of which three were long popular: "Tamerlane" (1702); "The Fair Penitent" (1703); and "Jane Shore" (1714). The character of Lothario in "The Fair Penitent" was the prototype of Lovelace in Richardson's "Clarissa Harlowe," and indeed the name is still the proverbial synonym for a fashionable rake. Rowe translated Lucan's "Pharsalia." His edition of Shakespeare (7 vols. 1709-1710) at least contributed to the popularity of his author. His comedy, "The Biter" (1705), failed. The Duke of Queensberry made him under-secretary of state; in 1715 he succeeded Tate as poet-laureate; the same year he was appointed one of the sur-

Rowing

veyors of customs to the port of London; the Prince of Wales made him Clerk of his Council; and the Lord Chancellor Parker secretary of Presentations in Chancery. He died Dec. 6, 1718, and was buried in Westminster Abbey.

Rowing, the propulsion of a boat by oars. The oarsman sits with his face to the stern of the boat, his feet planted flush against his "stretcher" or footboard, and the handle of his oar in his hands, the loom of the oar resting in the rowlock, the "button" being inside the thowl-pin. He should sit upright, with a rigid back, and do his



POSITIONS IN ROWING.

1, entering the water; 2, end of the stroke; 3, positions of the wrists in feathering the oar.

work mainly with his back and legs, using his arms as couplings between his body and the oar handle, and only bending them toward the finish of his stroke. To row a stroke, swing the body forward from the hips straight toward the toes; extend the arms rigidly, brace the shoulders, and keep the head up. The hands should be holding the oar handle about $3\frac{1}{2}$ inches apart. The grasp should be with fingers and not fist — *i. e.*, the lower knuckles of the hand should be very slightly bent, almost straight, the hold being retained by the upper joints of the fingers and by the thumb. This mode of holding the oar gives freer play to the

Rowing

wrist-joints for the "feather," The body being thus extended, and the legs opened at the knees to allow the body free swing forward, and the hands thus grasping the oar handle, then the stroke is begun by raising the hands enough to allow the blade of the oar to sink into the water square. It is most important that the blade should be square to the plane of the surface of the water; otherwise, as soon as the stroke commences, the blade fails to preserve its own plane, and sinks too deep, or springs out of water, according as the face of it is inclined at an obtuse or acute angle to the water.

When the oar has thus been lowered into the water, by raising the hands over the stretcher, the stroke should commence — sharply, by bracing the muscles of back, loins, shoulders, and legs, and throwing the body backward, swinging from the hips, the feet firmly pressing against the stretcher, the arms rigid; so that the weight of the body is eased as much as possible off the seat, and is transferred to the oar handle and the stretcher. When the body has reached the perpendicular, in the swing back, the arms should begin to come in. The action of bringing them in should be from the shoulders, the elbow joints gradually bending, but the forearm remaining as near as possible parallel to the water. The "biceps" should not be exerted, else the forearms bend upward, the hands rise, and the blade buries. The body should not "wait" for the arms and hands to overtake it: it should be still swinging back till the hands overtake it.

When the hands reach the breast bone they should be sharply dropped about two inches; this raises the oar out of the water. After this drop of hands they should be turned sharply from the wrists till the knuckles touch the body. This turn produces the "feather." If the turn is made too soon, before the hands have reached the chest, the action is faulty, and produces what is called "feather under water," by turning the oar edgewise in the water instead of after the oar has left the water. So soon as the drop and turn of wrists has ended and "feather" has been performed, the "recovery" should commence. The body should instantly, and without "hang" or delay, commence to swing forward again like a pendulum. The hands should at the same instant be shot out and the arms extended, reaching their extension by the time that the body has once more attained the perpendicular in its forward swing. The swing should continue forward till full reach has been attained for a new stroke; then once more the hands should be raised, the oar lowered into the water, and a new stroke rowed. In rowing behind another oarsman the eyes should catch the back in

Rowing

front of the oarsman, who should take time and swing from it—keeping “eyes in the boat.” The oarsman at first finds it difficult to “govern” his blade—*i. e.*, to keep it in the right plane and at the correct elevation or depression, according to whether he is rowing the stroke or is “recovering.” In time his wrists become more apt, and time their action to the ever-varying positions of the body. The more he attends to a correct grasp of his oar handle the easier will be the play of his wrists, and the greater facility will be found in regulating the plane of his blade.

It has been said before that the blade should be “square” to the water throughout the stroke. So it appears to the oarsman; but in well-constructed boats the “thowl” is slightly inclined in the direction in which the oarsman is looking; this inclination gives the oar-blade a correspondingly slight inclination forward, making it describe a trifle less than a rectangle with the water, and so obviates any tendency to row “deep.” It will suffice if the beginner thinks of keeping his blade “square;” and the small deviation from the square, reducing the angle that is effected by the slope of the thowl for his benefit, will then be produced naturally by the mechanism of his work. If this inclination of the thowl is made too great the oar has a tendency to fly out of the water.

To stop the way of a boat she should be “held.” This is done by laying the blade flat, and then slightly sinking the edge which lies toward the direction in which the boat is traveling. This causes the blade to bury at an acute angle to the plane of the water. This checks the way till it is reduced enough to allow the oarsman to turn the blade square, reverse way, and to “back” water. If he tries to back water with any pace on, before he has first “held” the boat, the resistance to his blade not only risks fracture, but is likely to be beyond his strength, to lay him flat on his back, and to make him “catch a crab.” In backing water the process of the stroke, described above, should be reversed, so far as circumstances will allow—*i. e.*, the oarsman has no stretcher to press against, and is “pushing” with his weight instead of “pulling.” In most “tub” boats, and in all racing boats, straps are laid across the stretcher, to hold the feet at the instep, and so to facilitate recovery. The strap should only be used as an adjunct to recovery, not as the sole means; the loins should play their part in swinging the body forward; and the arms, by being rapidly shot out, should aid the action of the loins. If a tyro is found to rely too much on his strap a mentor may with advantage remove the strap till proper use of the loins has been effected.

Rowing

Sculling.—In sculling each hand holds one scull, instead of there being two hands on one oar as in “rowing.” The principles of action of body, legs, and arms are the same as in rowing, except that the body, when sculling may with advantage be swung further back at each stroke than in rowing. The grip of a scull should be on the same principle, as regards holding in fingers and not in fist. The thumb should not clasp under the handle, but cap the butt of the scull with the top joint. In rowing this would be wrong; but in sculling it is found to secure the better hold and to give freer play to the wrists for feathering. It is important that both hands should work together, and both blades entering and quitting the water together, and both wrists feathering simultaneously. If one hand is later than the other the course of the boat is distorted at each stroke.

Boat Racing.—Vergil, in “Æneid,” v., describes a boat race between four Trojan galleys, and the word “regatta” is of Italian origin. But boat racing may be said to be almost exclusively an Anglo-Saxon sport. Germans of late have taken it up, but 95 per cent. of the sport is found in Great Britain and her colonies and in the United States. Eton and Westminster schools practised boat racing in the early part of the 19th century; thence the pastime seems to have spread to the universities. One of the earliest races of the century was between Westminster boys and the “Temple” crew, in six oars, the boys winning. As early as 1815 college “bumping” races in eight oars had begun at Oxford. In those days only three or four colleges manned eights. Cambridge adopted a similar sport at much the same date, or a year or so later. In 1829 the first Oxford and Cambridge match was rowed—Hambleton lock to Henley Bridge. The next was in 1836, Westminster to Putney; after that at intervals till 1856, since which date these matches have been annual. “Outriggers” were first used by the two university crews in 1846. Sliding seats were first used by them in 1873. “Keelless” eights were first used by them in 1857. In 1845 the Putney to Mortlake course was first adopted for these matches. Outriggers are a contrivance for artificially extending the gunwales of a boat, so as to give the required leverage for the oar in the rowlock, while the rest of the hull is narrowed to offer less resistance to the water. The earliest application of the principle was with wooden outriggers on the Tyne before 1836. Iron outriggers were first used by H. Clasper for a Tyne firm in a Thames regatta in 1844.

Professional Racing.—The earliest recorded professional champion sculling race was in 1831, when one Campbell, Thames waterman, beat one Williams for the cham-

pionship of the Thames from Westminster to Putney. In 1847 the Putney to Mortlake course was first adopted for these watermen's matches. In 1859 the title first left the Thames, and was won by R. Chambers of the Tyne. It oscillated between the representatives of these rivers, aliens and colonials now and then competing unsuccessfully till 1876, when E. Trickett of Australia beat J. Sadler of the Thames. Since that date the sculling premiership has oscillated between Canada and Australia; E. Hanlan of Toronto, W. Beach of Sidney, and W. Searle of Sidney being the most noted holders. In 1889 Searle the holder died; and there being no tribunal to decide which two of various aspirants had the first claim to compete for the vacancy, or how many must compete before a new premier could be recognized, some doubt arose as to which, McLean or Stansbury of Australia or O'Connor, United States, had the best claim at that moment to the honor.

The "Amateur Sculling Championship" is symbolized by the "Wingfield Sculls," established in 1830. The trophy now carries with it the amateur championship of England. The holder has to meet the best of all challengers once a year, on a date fixed by a committee of old champions, about July, or to abandon in favor of the best challenger.

Regattas.—Henley regatta was founded in 1839. In 1886 the course was changed as to some 300 yards of its length, to avoid a corner which gave unfair advantages. It is now a three days' meeting, and comes off early in July each year. The prizes are "Grand Challenge," for best eight oars; "Stewards' Cup," for best four oars; "Ladies' Plate," for college and school eights; "Thames Cup," for second-class eights; "Wyfold Cup," for second-class fours; "Visitors," for college and school fours; "Silver Goblets," for any pair of oarsmen; and "Diamond," for sculls. By first and second-class eights and fours are meant the classes which usually compete at the races referred to — *e. g.*, no one who rows for "Grand Challenge" may row for "Thames Cup" the same year; nor if he rows for "Stewards'" fours may he row in a Wyfold crew; and as the "Grand" and "Steward" are the more valuable prizes, the better eights and fours usually elect to do battle for them, and the weaker reserve themselves for the lesser races. There are other regattas of less importance — *e. g.*, "Metropolitan," on the Thames tideway, Kingston-on-the-Thames, Walton-on-Thames Mousley, Reading, etc.; and provincial regattas at Tewkesbury, Bridgenorth, Worcester, Tyne, Durham, Burton-on-Trent, Bedford, etc.

The best regattas affiliated themselves to the "Amateur Rowing Association," the

object of which is to promote rowing, and to put a stop to performances inconsistent with amateur status — *e. g.* rowing for money prizes, and the introduction of competitions against artisans, mechanics, etc. Such classes, by making a business of muscular toil, have an advantage for muscular development over amateurs, whose more sedentary vocations give them less opportunity for developing muscle. At the same time it is the opinion of good judges that at the present day the best amateur oarsmen would in rowing defeat the best professional oarsmen. In sculling, apparently, the best colonial professional scullers are still superior to the best British amateur scullers but the best British professionals are probably no better than, if so good as the average amateur Wingfield sculler of the present day. The Amateur Rowing Association publishes a code of regatta rules. All regattas which are affiliated to the Amateur Rowing Association adopt this code. Oarsmen who row at regattas where this code is not in force become thereby ineligible to row afterward at regattas where it holds good.

Professional Regattas and Prizes.—A professional regatta for watermen was revived in England in 1890 and promises to continue. It is under the patronage of the leading amateurs of the day. There were similar regattas between 1843 and 1849 inclusive, again between 1854 and 1866 inclusive, and again between 1868 and 1876 inclusive. In the other years not specified no local professional regattas were conducted by leading amateurs; but in 1876–1877–1878 a "speculative" regatta for gate money and traffic purposes was got up by the Steamboat Company and contingent railways. "Doggett's Coat and Badge" is an old-established race dating from 1719. Mr. Doggett, a comedian, provided it. It is for watermen's apprentices; the winner gets an ornamental red coat, a silver badge, and "freedom" of the Thames — *i. e.*, his fees for taking up his freedom as a waterman are paid for him. No one who is not "free" of the Thames may ply for hire on it to carry passengers. This regulation dates from days when the Thames was more of a highway for passenger rowing boats than it now is. Watermen's wherries then plied from numerous stairs, and it was important that none but competent and certified oarsmen should have the charge of passengers. There are other coats and badges extant, given at divers times by philanthropists to encourage watermen's apprentices. An apprentice has to serve seven years to a waterman before he is qualified to be "free" of the river.

Bumping Races.—In "bumping" races at the universities the various boats start in line, 120 feet apart, by signal of cannon.

The order of starting depends on order of precedence in the last previous race, whether the same year or the year before. If a boat is touched from behind in the race, both boats row into the bank; and the "bumped" boat loses a place and changes order next time with the boat that so "bumped" it.

Time Races.—At Oxford and Cambridge, owing to the narrowness and curvatures of their respective rivers, other races, such as for four oars or sculls, are rowed as "time" races. The boats start two at a time, 80 yards apart, and their respective winning posts are the like distances apart, and their respective arrivals at their goals are announced by pistol shots.

Level Racing Rules.—In regattas and matches boats start abreast, and in modern times to ensure equal starting the rudder of each competitor is held from a starting boat, one for each racing crew, moored in line. "Fouling" is not allowed; each boat has to keep its own water; the umpire is sole judge of the course and of fouling, and usually follows the race in a fast eight or steam launch. All boats abide by their accidents—*e. g.*, of broken gear or upsets.

Sliding Seats.—The use of sliding seats began in 1871 in England. Americans had previously used but thought little of the novelties. A Tyne crew, captained by F. Taylor, matched against another Tyne crew, used such seats in a match in November, 1871, and won with them. Next year four Henley crews adopted them with marked success, and the London Rowing Club used them in a winning match vs. Atlanta Rowing Club, of New York. In 1873 they became universally adopted. Leading amateur clubs prohibit use of slides by their beginners till swing on fixed seats has been first mastered, else there is a tendency in a tyro to sacrifice swing to slide. Slide should conclude with swing. The slide should be held till the body is nearly or quite perpendicular in the swing back. Then the slide may be released, and the legs should be extended gradually, the extension to terminate contemporaneously with the oar reaching the chest.

Faults in Rowing.—A "coach" or tutor of a crew endeavors to cure faults by admonition, so as to get his crew into "form" and style. Uniformity of oars and of action of bodies has much to do with pace in a racing boat, though, of course, strength is also an important factor. Still a strong oar who mars uniformity among his comrades often does more harm than good, and is well replaced by a lighter and neater oarsman. Among salient faults may be specified "rowing out of time," by letting the oar enter or leave the water too soon or too late; "rowing light"—*i. e.*, not covering the blade; "rowing deep"—*i. e.*, burying the shank as well as the blade of

the oar; "feathering under water"; "sliding too soon" or too suddenly. Among "faults of swing" are "hanging" with the body before recovery, or when forward before dropping the oar in; delay in shooting out the hands; "bending the arms" too soon; bending the back in the middle of the stroke instead of swing from hips; hunching the shoulders; "screwing"—*i. e.*, not swinging straight in a line with the keel; "meeting the oar"—*i. e.*, swinging to meet the oar-handle instead of rowing it well home; "rowing short"—*i. e.*, not swinging to full reach forward.

Stroke and "No. 7."—A "stroke" is selected to set a good style to the men who are to copy him. Hence style more than rough strength is of importance for this post. A stroke should be lively in swing; sharp in catching hold of the first part of the stroke; long in reach; even in swing; even in time, like a pendulum; a good judge of the pace of stroke which he is rowing; capable of "spurting"—*i. e.*, of quickening the pace of stroke when extra speed is needed, and this without getting short in reach. Thirty strokes a minute is a fair practice stroke. In racing for a mile or mile-and-half course as many as 44 a minute can be rowed long by good crews. Over a four mile course 37 a minute, well rowed at full length of reach, is about as much as can be done, excepting a final "spurt." "No. 7" is second to none in importance in an eight oar. He couples stroke to the crew. The best man in the team should if possible be placed here; a weak No. 7 takes many points of merit off a crew, and cripples the work of good but rough men behind him.

Steering.—Four oars are now rowed without coxswains, except in junior or second-class races. One of the oarsmen steers with levers attached to his stretcher and connected with the rudder by wires. In an eight, a coxswain is an important factor; he should have nerve and judgment, and be capable of reminding his crew of faults, when, as in a race, no "coach" or mentor can attend them. The main art in steering is to keep the boat in a straight course by gentle touch and adjustment of the rudder lines, not by hard pulls, which tend to spoil equilibrium, and to bring the boat round too sharply. In going round a curve the bows should not be expected to point in the direction required. They must of necessity point outward, because the boat lies as a tangent to a curve.

Training.—"Condition" promotes endurance in a contest, whether of horse or man. Hence training is an important item in preparation for a boat-race. Hard work trains; regulated diet keeps the oarsman up to this hard work, and puts on extra muscle to replace fat which hard work has sweated off. Five weeks is a minimum time for full training where oarsmen have been out of

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work for some time; a shorter period may suffice if they have not been inactive for long. Professionals usually train for three months before a match. The usual rules are early rising — say 7 A. M.—a short morning walk, bath, breakfast, morning row (if studies or business hours admit of it), luncheon or mid-day dinner, afternoon or evening row (according to season of year), late dinner or supper, a short post-prandial stroll, a cup of gruel or chocolate, and bed for nine hours. After each row the body should be well washed and rubbed down. As to diet. For breakfast: beef or mutton, cold or broiled; some fish, if wanted; an egg; watercress or lettuce; and two cups of tea; stale bread or toast. Luncheon: cold meat and some green food; or broiled meat and vegetables. Dinner: fish; joints of beef or mutton; vegetables — any greens, asparagus, spinach, a potato or two, etc.; now and then a modicum of poultry as an extra course; stewed fruit; rice or plain farinaceous pudding. Drink: at luncheon or dinner, ale, claret and water, or champagne. A pint at each meal usually suffices; in sultry weather a little more fluid may be allowed, in which case it is best to let the extra supply be water only. Oranges or strawberries are allowed for dessert, and a glass or two of claret or one of port. Pork and veal are tabooed, as being indigestible in the large quantities which hungry men consume. Such is modern training. In earlier decades less liberality was allowed. Steaks, chops, and plain joints formed the staple supplies, and the hobby was to have them “underdone,” almost to semi-rawness. This system often produces disorder of blood, resulting in boils, the effect of too much animal food without sufficient green meat. Professionals still adhere to old creeds of training more tenaciously than do modern amateurs.

University Records.—The following is the record of the Oxford and Cambridge races from their beginning; distance, about 4 miles; course generally on the Thames between Putney and Mortlake:

Date.	Time.	Winner.
June 10, 1829.....	14.30	Oxford.
June 17, 1836.....	36.00	Cambridge.
April 3, 1839.....	31.00	Cambridge.
April 15, 1840.....	29.30	Cambridge.
April 14, 1841.....	32.30	Cambridge.
June 11, 1842.....	30.45	Oxford.
March 15, 1845.....	23.30	Cambridge.
April 3, 1846.....	21.05	Cambridge.
March 29, 1849.....	22.00	Cambridge.
Dec. 15, 1849.....	.....	Oxford.
April 3, 1852.....	21.36	Oxford.
April 8, 1854.....	25.29	Oxford.
March 15, 1856.....	25.50	Cambridge.
April 4, 1857.....	22.35	Oxford.
March 27, 1858.....	21.23	Cambridge.
April 15, 1859.....	24.40	Oxford.
March 31, 1860.....	26.05	Cambridge.
March 23, 1861.....	23.30	Oxford.
April 12, 1862.....	24.41	Oxford.
March 28, 1863.....	23.06	Oxford.
March 19, 1864.....	21.40	Oxford.

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Date.	Time.	Winner.
April 8, 1865.....	21.24	Oxford.
March 24, 1866.....	25.35	Oxford.
April 13, 1867.....	22.40	Oxford.
April 4, 1868.....	20.56	Oxford.
March 17, 1869.....	20.05	Oxford.
April 6, 1870.....	22.04	Cambridge.
April 1, 1871.....	23.05	Cambridge.
March 23, 1872.....	21.15	Cambridge.
March 29, 1873.....	19.35	Cambridge.
March 28, 1874.....	22.35	Cambridge.
March 20, 1875.....	22.02	Oxford.
April 5, 1876.....	20.20	Cambridge.
March 24, 1877.....	24.08	Dead heat.
April 13, 1878.....	22.13	Oxford.
April 5, 1879.....	21.18	Cambridge.
March 22, 1880.....	21.23	Oxford.
April 8, 1881.....	21.51	Oxford.
April 1, 1882.....	20.12	Oxford.
March 15, 1883.....	21.18	Oxford.
April 7, 1884.....	21.39	Cambridge.
March 28, 1885.....	21.36	Oxford.
April 3, 1886.....	22.26	Cambridge.
March 26, 1887.....	20.52	Cambridge.
March 24, 1888.....	20.48	Cambridge.
March 30, 1889.....	20.14	Cambridge.
March 26, 1890.....	22.03	Oxford.
March 21, 1891.....	22.00	Oxford.
April 9, 1892.....	19.21	Oxford.
March 22, 1893.....	18.47	Oxford.
March 17, 1894.....	21.39	Oxford.
March 30, 1895.....	20.10	Oxford.
March 28, 1896.....	20.04	Oxford.
April 3, 1897.....	19.12	Oxford.
March 26, 1898.....	22.15	Oxford.
March 25, 1899.....	21.04	Cambridge.
March 31, 1900.....	18.47	Cambridge.
March 30, 1901.....	22.31	Oxford.
March 22, 1902.....	19.09	Cambridge.
April 1, 1911.....	18.29	Oxford.

The Harvard-Yale eight-oared contests since 1876 were as follows: distance, 4 miles; course, since 1878, at New London, Conn.:

Date.	Yale Time.	Harvard Time.	Winner.
June 30, 1876....	22.02	22.31	Yale.
June 30, 1877....	24.43	24.36	Harvard.
June 28, 1878....	21.29	20.45	Harvard.
June 27, 1879....	23.58	22.15	Harvard.
July 1, 1880....	24.27	25.09	Yale.
July 1, 1881....	22.13	22.19	Yale.
June 30, 1882....	20.50 ½	20.47 ½	Harvard.
June 28, 1883....	26.59	25.46 ½	Harvard.
June 26, 1884....	20.31	20.48	Yale.
June 26, 1885....	26.30	25.15 ½	Harvard.
July 2, 1886....	20.41 ½	21.15 ½	Yale.
July 1, 1887....	22.56	23.10 ½	Yale.
June 29, 1888....	20.10	21.24	Yale.
June 28, 1889....	21.30	21.55	Yale.
June 27, 1890....	21.29	21.40	Yale.
June 26, 1891....	21.57	21.23	Harvard.
July 1, 1892....	20.48	21.42 ½	Yale.
June 30, 1893....	25.01 ½	25.15	Yale.
June 28, 1894....	23.47	24.40	Yale.
June 28, 1895....	21.30	22.05	Yale.
June 29, 1899....	21.13	20.52 ½	Yale.
June 28, 1900....	21.12	21.27	Harvard.
June 27, 1901....	23.37	23.45	Yale.
June 26, 1902....	20.20	20.30	Yale.
June 25, 1903....	20.19 4-5	20.29 3-5	Yale.
June 30, 1910....	21.04	20.46 ½	Harvard.

Rowland, Henry Augustus, an American scientist; born in Honesdale, Pa., Nov. 27, 1848; was graduated at the Rensselaer Polytechnic Institute in 1870; taught for a year in Worcester University; became Instructor of Physics at the Institute there in 1872; assistant professor in 1874, and, after further study in Germany, was made Professor of Physics at Johns Hopkins University in 1876. He was a member of the

Electrical Congress in Paris in 1881; served on the jury of the Electrical Exhibition held there that year, and was the inventor of a process of ruling large diffraction gratings directly on concave mirrors. He was made president of the American Physical Society in 1889, and received honorary degrees from Yale University, in 1895, and from Princeton University in 1896. He died in Baltimore, Md., April 16, 1901.

Rowlock, a crotch or notch on the gunwale of a boat against which the oar works in rowing. Various devices are used: (1) Two short pegs or posts rising from the gunwale. (2) An iron stirrup pivoted in the gunwale. (3) An iron pin in the gunwale, and the oar fastened to it by a thong. (4) A pin in the gunwale passing through a hole in the oar. (5) A notch in the gunwale.

Rowson, Susanna, an English-American novelist; born in Portsmouth, England, in 1762. She appeared on the American stage for about a year; after which she settled in Boston, opening a school and turning her attention to literary pursuits. She wrote "Charlotte Temple: A Tale of Truth" (1790), which had an immediate and great success, and has long been a popular classic in America; and its sequel "Lucy Temple; or, the Three Orphans" (1782). Among her many other novels and farces may be named: "Victoria" (1786), the characters of which were drawn from life; and "The Inquisitor, or Invisible Rambler" (1788). She died in Boston, Mass., March 2, 1824.

Roxburghe Club, a society called after John, the 3d Duke of Roxburghe, whose celebrated library was sold by auction in London in 1812. The prices paid for some works were enormous; the highest (\$11,300), was paid for a first edition of "Boccaccio." The object of the society was to print MSS. and rare works for the use of the members only, who originally numbered 31, afterward increased to 40. The club gives name to a style of binding books, namely, in half-leather with gilt tops.

Roy, Just Jean Etienne, a French littérateur; born in Marnay, Haute-Saône, France, Oct. 13, 1794. He published, under his own name and the pseudonyms of "Étienne Gervais," "Just Girard," and "Théodore Menard," a number of books, including the series entitled "History of Fénelon" (1838); "History of Louis XI." (1842); "Illustrations of the History of Germany, England, Egypt, Spain, France, Italy, Russia, and Sweden" (1843-1845); "History of Louis XIV." (1844); "France of the Twelfth Century" (1850); "Modern Algiers" (1855); "The Empire of Brazil" (1858); "History of England" (1863); and many others, the greater number of

which ran through many editions. He died in Pontleroy, June 22, 1871.

Roy, Pierre Charles, a French poet; born in Paris, France, in 1683. His reputation rests largely on his two plays, "Callirhoé" (1712), generally conceded to be his best work, and "Semiramis" (1718), regarded by some as even superior. His ballet "The Elements" (1725) added to his reputation. His many odes, epilogues, plays, interludes, and ballets were collected after his death and published as "Various Works" (1727). His epigrams have made him famous in his own country; his last one involved him in a fatal quarrel. He died Oct. 23, 1764.

Royal Academy, The. See ACADEMY OF ARTS, THE ROYAL.

Royal Family. By the law of England royal rank is conceded to the wife or husband, children or other descendants, and collateral relatives of the sovereign. The husband of a reigning queen does not acquire any share in her prerogative rights, but it is usual to grant him special precedence; King Philip and William III. were associated in title and power with their wives by act of Parliament. Of the sovereign's children the eldest son is, of course, heir-apparent; he is born Duke of Cornwall, and he is always created Prince of Wales. The Prince and Princess of Wales and the Princess Royal (the eldest daughter of the sovereign) are within the protection of the statute of Edward III. relating to treason. An heir-presumptive to the throne has no special rank or precedence as such. The younger children of the sovereign take rank after the heir-apparent; by a statute of 1540 a place is assigned to them at the side of the cloth of estate in the Parliamentary chamber; it is customary to confer peerages on all the younger sons. On a reference by George II. to the House of Lords it was held that Edward, Duke of York, second son of the Prince of Wales, was entitled to a place among the king's children. Members of the royal family enjoy considerable privileges; they pay no tolls or duties, and they are exempted from succession duty and some other taxes.

In order to protect the succession to the crown against the dangers which might arise from unsuitable alliances, the following special rules are applied to members of the royal family: (1) By the Royal Marriage Act of 1772 it is enacted that no descendant of George II. (other than the issue of princesses married into foreign families) may marry without the consent of the sovereign; any marriage contracted without such consent is void. But any such descendant, if above the age of 25 may, after 12 months' notice to the privy council, contract marriage without such consent, unless both

Royal George

Houses of Parliament declare their disapproval. All persons who solemnize or are present at a marriage contrary to the act are liable to the penalties of *præmunire*. The act was passed in consequence of the marriage of the Duke of Gloucester with the Widow Waldegrave and of the Duke of Cumberland with the widow of Colonel Horton. In 1793 the Duke of Sussex was married at Rome to Lady Augusta Murray; the marriage was declared void by the Prerogative Court, and the claims of Sir Augustus d'Este, eldest son of the marriage, were rejected by the House of Lords in 1844. (2) The grandchildren of the sovereign (not being the issue of princesses married to foreigners and residing abroad) are under the control of the sovereign, who may order the place of their abode without regard to the wishes of their parents. The law was so laid down by a majority of the judges in the case of the children of Frederick, Prince of Wales, in 1737. The policy of these rules has been much questioned, and the conduct of George IV. in regard to his marriage with Mrs. Fitzherbert in 1785 affords a strong argument against the existing law. The civil list being found inadequate to the maintenance of the royal family, Queen Victoria was empowered to grant annuities, payable out of the Consolidated Fund, to various members of her family; the aggregate amount of these allowances reached \$940,000 per annum.

Royal George, an English man-of-war of 108 guns, lost off Spithead, England, Aug. 29, 1782. While heeled over to repair a pipe, a sudden gust of wind washed the sea into her ports, and she went down. Rear-Admiral Kempenfeldt, the crew, many marines, women and Jews, in all about 600 persons, were drowned. By the use of the diving bell the ship, embedded in the deep, was surveyed at various times, beginning in May, 1817. Portions of the vessel and its cargo were brought up in 1839-1842, under the superintendence of Sir Charles Pasley, when gunpowder was ignited by the agency of electricity.

Royal Household, those persons who hold posts in connection with the household of the British sovereign, including the keeper of the privy-purse and private secretary, lord steward, treasurer, comptroller, master of the household, lord chamberlain, vice-chamberlain, master of the horse, captains of the gentlemen-at-arms, and yeomen of the guard, master of the buck-hounds, earl-marshal, grand falconer, lord high almoner, hereditary grand almoner, mistress of the robes, ladies of the bedchamber, bedchamber-women, maids of honor, lords-in-waiting, master of ceremonies, physicians in ordinary, poet laureate, etc.

Royal Institution, an institution founded in London, England, by Count Rum-

Royal Observatory

ford, Sir Joseph Banks, etc., March 9, 1799, and incorporated Jan. 13, 1800. It was reconstituted in 1810. It is designed to diffuse knowledge, to facilitate the general introduction of mechanical inventions, and teach by lectures and experiments the application of science to the common purposes of life. It has, as a rule, had for its lecturers some of the first scientific men of the age; *e. g.*, Thomas Young, Davy, Brande, Faraday, Tyndall, Frankland, and Rayleigh. It maintains professors of natural philosophy, chemistry and physiology, and has laboratories (including since 1896 the Davy-Faraday research laboratory presented by Dr. Ludway Mond).

Royal Marriage Act, an act of George III. passed by the British Parliament in 1772, which forbids all descendants of George II., other than the issue of princesses married into foreign families, to contract marriage without the consent of the sovereign, signified under the great seal. But such descendants, if above the age of 25, may dispense with the consent of the crown, unless both Houses of Parliament expressly declare their disapproval within 12 months after notice of the intended marriage has been given to the privy council. Marriages otherwise entered into are void.

Royal Observatory, Greenwich, the famous English observatory founded by Charles II. in 1675. The first observation was made Sept. 19, 1675. The Director of the Observatory is styled the Astronomer Royal, and is under the official control of the Admiralty, but receives his appointment directly from the Prime Minister, and holds office by warrant under the royal sign manual. The meridian observations of sun, moon, planets and stars, which constitute the fundamental work, are made with a fine transit-circle of 8 inches aperture. An altazimuth on a new principle with telescope of 8 inches aperture has been constructed to supplement the observations with the transit circle. The largest instrument is a 28-inch refractor, with a spectroscope attached which has been recently mounted. Another fine instrument is the astrophysical equatorial designed for work in connection with the "Photographic Chart of the Heavens." A new equatorial, having on one side of the declination axis a lens corrected for photographic rays of 26 inches aperture, and on the other side a mirror of 30 inches diameter, was presented to the Observatory by Sir Henry Thompson. There are several smaller refractors used for observing comets, occultations of stars by the moon, Jupiter's satellites, etc. Photographs of the sun are taken on every available day, and after being measured are carefully stored for reference. Magnetic and meteorological observations, made continuously, form an important branch of the works. The chronometers used

Royal Society

in the English navy are purchased, and generally examined, at the Observatory. Hourly and daily time-signals are sent out from the Observatory through the postoffice telegraphs giving Greenwich time to all parts of the country.

Royal Society (London), a society for prosecuting research in general and physico-mathematical science in particular, founded in 1660. In 1645, a few friends, including Drs. Wilkins and Wallis, established a scientific club in the metropolis, which maintained a checkered and intermittent existence sometimes in London, at others in Oxford, till at length being revived at the Restoration it became the parent of the Royal Society. At a meeting of the club, held Nov. 28, 1660, the formation of a new society was resolved on, and its scope and constitution defined. Its first public action took place Dec. 5, 1660, and the members, in 1662, obtained a charter, and were incorporated as the Royal Society. Charles II. flattered himself that he was its founder, and among the names of its fellows was that of the Duke of York, afterward James II. Sir Isaac Newton was elected a fellow in January, 1672, admitted in February, 1672, and in 1703 became president. The first number of the "Philosophical Transactions," recording the work of the society, appeared on March 6, 1665. After 1800 the annual volume took the place of occasional numbers. In 1709 a bequest from Sir Godfrey Copley led to the establishment of the Copley gold medal, and a donation from Count Rumford in 1796 resulted in the foundation of the Rumford gold and silver medals. Two more medals were established by George IV. in 1825. The Linnæan Society branched off from it in 1788, the Geological Society in 1807, and the Royal Astronomical Society in 1820. For a considerable time the number of the members stood at 600; latterly, however, only 15 members have been annually elected, so that the number of fellows will in a few years be reduced below 500. With the exception of a small Roman Academy, the Royal Society of London was the first of the kind established, the Royal Academy of Science at Paris not having arisen till 1666.

Many of the most important scientific achievements and discoveries have been due to its enlightened methods. It deservedly enjoys an influential and semi-official position as the scientific adviser of the British government, and not only administers the \$20,000 annually voted by Parliament for scientific purposes, but has given suggestions and advice which have borne valuable fruit, from the voyage of Captain Cook in the "Endeavor" in 1768 down to the "Challenger" expedition, more than a century later. The society has an independent income from property of less than \$25,000, be-

Royal University

sides the annual subscriptions of \$20 from each fellow. The Royal Society met in Gresham College till 1710, with the exception of eight years after the great fire of London in 1666, when they found a welcome in Arundel House from Henry Howard, who presented his learned guests with the library purchased by his grandfather, Earl of Arundel, thus forming the nucleus of the present valuable library of the Royal Society, which contains about 50,000 volumes. From 1710 till 1780 the meetings of the society were held in Crane Court, thereafter in Somerset House, and finally since 1857 in its present quarters at Burlington House. The roll of the Royal Society contains practically all the great scientific names of its country since its foundation. Among its presidents have been Lord-Chancellor Somers, Samuel Pepys, Sir Isaac Newton, Sir J. Banks, Sir Hans Sloane, and Sir Humphry Davy.

Royal Society (Edinburgh), a Scotch society of a similar type to the English institution, which was incorporated in 1783, having been developed from the Philosophical Society of Edinburgh, commenced in 1739. Among its early members were Hume, Reid, Edmund Burke, Hutton, Dugald Stewart, and James Watt; and among its presidents have been Sir Walter Scott, Sir David Brewster, the Duke of Argyll, Lord Moncrieff, and Sir William Thomson.

Royal Society of Literature, a society founded in England under the patronage of George IV., in 1823, and chartered in 1826. It awards gold medals.

Royal University of Ireland, an institution founded in 1880 in pursuance of the provisions of the University Education (Ireland) Act, 1879, to take the place of the Queen's University, a similar institution established in connection with the Queen's Colleges. The Royal University corporation consists of a chancellor, a senate, and graduates, the government being vested in the chancellor and senators, the latter not to exceed 36 in number. It has power to confer all such degrees and distinctions as are conferred by any university in the United Kingdom except in theology, and these may be bestowed on all male and female students who have matriculated in the university and passed the prescribed examinations, no residence in any college or attendance at any course of instruction in the university being obligatory on any candidate for a degree other than a degree in medicine or surgery, the university in this respect resembling that of London. An act of 1881 provided for the payment of \$100,000 a year out of the surplus funds of the Irish Church for the purposes of the university, which has its seat at Earlsfort Terrace, Dublin. The university has a considerable staff of examiners, but of course no professors.

Royce, Josiah, an American educator and author; born in Grass Valley, Cal., Nov. 20, 1855. He became Professor of the History of Philosophy in Harvard in 1892, and published: "A Primer of Logical Analysis" (1881); "The Religious Aspect of Philosophy" (1885); "California" (1886); "The Feud of Oakfield Creek" (1887), a novel; "The Spirit of Modern Philosophy" (1892); "Studies of Good and Evil" (1898); "The World and the Individual" (1900); "The Conception of Immortality" (1900); and many articles and lectures.

Royer, Alphonse, a French dramatist and littérateur; born in Paris, France, Sept. 10, 1803. After spending a number of years in the Orient, he turned to the production of dramatic literature, meeting with marked and lasting success. Many of his plays were written in collaboration with his friend Gustave Vaëz. They include: "The Poor Boys" (1830); "Venice the Beautiful" (1834); and "Adventures of Travel" (1837). He also published a "Universal History of the Theater (1869-1871), and many literary miscellanies. He died in Paris, April 11, 1875.

Royer-Collard, Pierre Paul, a French statesman; born in Sompuis, France, June 21, 1763. On the outbreak of the Revolution he was elected a member of the municipality of Paris, and in 1790-1792 acted as joint-secretary. Having incurred the enmity of the Jacobins, he lived in hiding at Sompuis during the Reign of Terror. Three years afterward (1797) chosen to the Council of the Five Hundred, he took an active part in the work of that assembly, till the 18th Fructidor. In 1811 he was appointed Professor of Philosophy in Paris, and exercised an immense influence on the philosophy of France. Rejecting the purely sensuous system of Condillac, he gave special prominence to the principles of the Scotch school of Reid and Stewart. Strongly "spiritualist" as opposed to materialism, he originated the "Doctrinaire" school, of which Jouffroy and Cousin were the chief representatives. He was appointed president of the Commission of Public Instruction in 1815, but resigned that post in 1820; in 1815 also he returned to political life as deputy for the department of Marne. The French Academy opened its doors to him in 1827; and in 1828 he was named president of the Chamber of Representatives, and in that capacity presented the address of the 221 deputies (March, 1830) withdrawing their support from the government, which the king refused to hear read. Next day the Chamber was prorogued. From 1842 Royer-Collard completely withdrew from public life. His salon was latterly the resort of such men as Cousin, Guizot, De Broglie, Casimir Périer,

Villemain, De Rémusat, and others. He never was a writer, and he became a philosopher only by accident; his true interest in life was politics, his real eminence as a political orator after the ancient pattern rather than that of the modern parliamentary debater. He died in his country seat, Châteauneuf, near St. Aignan, Loir-et-Cher, Sept. 4, 1845.

Royston Crow, the common English name for the hooded crow, *Corvus cornix*. See CROW.

Ruatan, or Roatan, an island of Central America, in the Bay of Honduras; area, about 240 square miles. Surface, somewhat elevated and well wooded; soil, fertile. The shores abound in fish and turtles, and near the S. extremity is a good harbor.

Rubace, or Rubasse, in mineralogy: (1) Rock crystal from Brazil, inclosing red scales of hematite or goëthite. (2) Rock crystal which, when heated and plunged into a cool colored solution, becomes fissured and admits the red coloring matter. (3) Rubicelle. (4) Rose-quartz.

Rubber. See CAOUTCHOUC.

Rubber, Artificial, a new industry which has been established on an apparently firm basis in England, using for its raw material linseed oil, or any of the other vegetable oils of similar properties. Its products partake of many of the qualities of india-rubber and gutta-percha, the supplies of which show a constant tendency to fall below the growing demands.

It is well known that when linseed oil is spread out in a thin layer exposed to the air it absorbs oxygen and becomes hard. When oil is left in bulk exposed to the air it gradually becomes "fatty," as it is called technically, or of a gummy consistency. Exposures of different periods will give any grade of hardness between these two. Other vegetable oils act in the same way, and many attempts have been made to take commercial advantage of these qualities. Some, like the manufacture of oil cloths and linoleum, have been successful. The difficulty experienced heretofore in attempting to use the oxidized oils for other purposes has been the fact that it was mechanically impossible to accomplish the perfect and graded combination of the oxygen with the oil which might be needed for the different purposes. The English system, it is asserted, entirely overcomes this trouble, and a large factory has been built where many articles are manufactured from the oils solidified by the process. The method of treating the oil is to saturate a quantity of tow with it, and then, in a centrifugal machine, throw out every particle of the oil except that which clings in minute globules to the fiber of the tow itself. The bunches

of tow are then put on grids of metal in a chamber where warm air is forced through them and in 24 hours the oil is thoroughly oxidized. The material is then ground up, mixed with any desired coloring matter, and finally rolled out into sheets, in which condition it resembles india-rubber and possesses many of the qualities of rubber and gutta-percha. It is as resilient as rubber, but not as elastic, is impervious to chemical action, and withstands heat up to 240° F., and it can be vulcanized by the same processes used for rubber and gutta-percha. It has high electrical insulating qualities and can be used for cable-wire coverings and other forms of electrical insulators, and it is made into wheel tires, which are said to be equal to those of rubber. It can be dissolved in ethereal spirits of all kinds, and from these solutions it can be applied as waterproofing coverings for fabrics of any sort.

Rubber Groves, a name applied to the tracts of territory where the rubber of commerce is obtained. While the india-rubber of commerce has been obtained from many different parts of the globe, the world has been compelled to look to Central and South America for the bulk of its supply. South America, especially Brazil, is the territory on which the commercial world relies, and when the statement is made that there is great danger of the diminution of the supply of crude rubber from the Amazon valley it awakens thought.

Figuratively, the rubber trees of the Amazon are gold mines which require no shafts, no machinery, no costly experiments, no guesswork, and practically no risk nor labor. The only thing to be guarded against is the killing of the geese which lay the golden eggs. All that has been done to accumulate riches from the rubber trees is to hire the willing natives to enter the jungles, tap the trees, and let the liquid gold run into one's coffers. In the great rush for becoming suddenly rich, however, in the lower Amazon field—the delta—many rubber forests have already become exhausted. While the coming Brazilian Congress intends to discuss the question of preserving the forests, no such precautions have as yet been taken at all.

If but three gashes per day are made in the rubber tree, and the hatchet in the careless hands of the native does not penetrate or strike the wood, the tree does not appear to suffer from the treatment, except that the trunk grows thick and the scarred surface becomes irregular and bumpy. It will continue, however, in good health and yield milk in abundance for 30 or 40 years. If the blow from the hatchet however, wounds in the slightest degree the wood of the tree it dies. Decay begins at

this wound. As the wood is soft, a little weevil called *punilna* enters the decayed spot, as a worm does the body, and hastens the destruction. The tree may drag out a miserable half-dead existence, but, as they say in Portuguese, it is "cancado." It will be seen how very easily the destruction of even almost "inexhaustible" forests may be completed by a mere blow of a hatchet in the hands of a marauding native. For this reason very many of the once "inexhaustible" rubber swamps of the lower Amazon are already wholly or partially abandoned, and the same fierce onslaughts are being made on the virgin swamps of the upper tributaries. Renters of swamps are naturally less careful of the trees than are the owners, who manage the property from a central station. But the principal forests are "owned" in Para or Manaos by those dealers who are interested only in the present supply, and who have no interest in the future production.

This carelessness with regard to the future can be offset with cultivation elsewhere, if begun at once, and those who have investigated the matter believe that the everglades of Florida offer the best inducements for experimental culture. The conditions of moisture, heat, and soil there are just about on a par with the conditions where the rubber tree flourishes, and as for wonderfully remunerative returns there is no question. It is simply a matter of time. Many years elapse before the rubber tree produces sufficient milk to justify its planting, but after it does begin to do so the profit is sufficient to pay for much greater delay. It is true, however, that Brazil is "the land of tomorrow," and if anything is done Anglo-Saxon energy must do it.

The rubber tree of the Amazon valley grows spontaneously; a man can gather enough of the nuts in a day to plant a quarter section of land; they germinate easily and grow rapidly; 538 trees will do well to each acre; the land needs no preparation, and no cultivation or care is necessary. Taking the most unfavorable figures of the rubber swamp and applying them to the rubber grove, the man who cares for 150 trees in the swamp could care for an acre with its 538 trees. As four kilos is an average yield from the 150 trees, his 538 would yield him 15 kilos per days. One dollar per kilo is an average price, and so the laborer could make \$15 per day, with no outlay but his ordinary living expenses, during four or five months in the year.

In 1865 Señor Joaquim Antonio da Silva, now deceased, but then living on the Guama river, 12 miles above the city of Para, had 20,000 young rubber trees planted on the low alluvial island in the river, called Bom Intento, which formed part of his estate. He paid to Francisco Rahia, the man who

Rubble

did the work, the sum of 16 cents apiece for the young trees when planted. The 20,000 young trees thus cost him a total outlay of \$3,200. Unfortunately the trees were all planted near the margin of the island on its whole circumference, as only a small part of the island was to be planted, and it was less trouble to plant near the shore than to work his way through the jungle further inland. The tide ebbs and flows with tremendous power, and tears away and builds up the island at one or the other end, alternating by periods of 10 years. Consequently only about 1,000 of the original 20,000 trees remain. These, however, are in excellent condition and yield abundantly, though they have never cost a cent for care or cultivation.

Since an acre of rubber-yielding trees will yield between \$400 and \$500 per month, the 20,000 trees mentioned, occupying a 40-acre tract, would mean an income of \$20,000 per month for four or five months of every year. While 20 or 25 years is quite a while to wait for the returns to begin to come in, yet the receipts are so great, and the expense of such an enterprise so little, that Northern capital and energy will probably at no distant day solve the problem of preserving rubber forests in the characteristic Anglo-Saxon way.

Rubble, a common kind of masonry, in which the stones are irregular in size and shape. Walls faced with ashlar are generally packed with rubble at the back. Rubble is of various kinds, according to the amount of dressing given to the stones. Common rubble is built with stones left almost as they come from the quarry. Hammer-dressed rubble is so called when the stones are squared with the mason's hammer; coursed rubble, when the stones are squared and equal in height, etc.

Rubefacients, external agents employed in medicine for the purpose of stimulating, and consequently reddening, the part to which they are applied. All agents which, after a certain period, act as blisters may be made to act as rubefacients, if their time of action is shortened. The mildest rubefacients are hot poultices, cloths soaked in very hot water, moderately stimulating liniments—as, for example, soap-liniment, with various proportions of liniment of ammonia, or chloroform, etc. Spanish fly, in the form of *Emplastrum Calefaciens*, or warm plaster, in which the active ingredient is blunted by the free admixture of soap plaster, resin plaster, etc., is a good form of this class of agents. Capsicum or cayenne pepper, in the form of a poultice, is an excellent rubefacient; it is much used in the West Indies. Mustard in the form of *Cataplasma Sinapis*, or mustard poultice, and oil of turpentine are perhaps the best of the or-

Rubens

dinary rubefacients. The former is applied to the soles of the feet and the calves of the legs in the low stage of typhus fever, in apoplexy and coma, in narcotic poisoning, etc. It is also applied to the chest, with much advantage, in many cases of pulmonary and cardiac disease, and to the surface of the abdomen in various affections of the abdominal viscera. The best method of employing turpentine is to sprinkle it freely on three or four folds of clean flannel wrung out of boiling water. The sprinkled surface of this pad is placed on the skin, and a warm dry towel is laid over the flannel. Two or three such applications will produce a powerful rubefacient effect. Turpentine thus applied is serviceable in all the cases mentioned in the remarks on mustard, as well as in sore throat, chronic rheumatism, neuralgia, etc.

Rubellite, in mineralogy, a red variety of TOURMALINE (*q. v.*), occurring in crystals mostly transparent and containing lithia.

Rubens, Peter Paul, a distinguished Flemish painter; born in Siegen, Westphalia, June 29, 1577. When he was 10 years old, his mother, then a widow, returned to her native place, Antwerp. He received an excellent education; and after studying in his own country, especially under Otto Van Veen, he went to Italy, where he improved himself by copying the works of the best masters, but chiefly Titian. While in Italy he was employed by the Duke of Mantua, not only as an artist, but on an embassy to Madrid. He returned to Antwerp in 1608, and was soon after made court painter to the Archduke Albert, Spanish governor of the Low Countries. In 1620 he was employed by the Princess Mary de Medici to adorn the gallery of the Luxembourg with a series of paintings illustrative of the principal scenes of her life. While thus engaged he became known to the Duke of Buckingham, who purchased his museum. He was afterward employed by the Infanta Isabella and the King of Spain in some important negotiations which he executed with such credit as to be appointed secretary of the privy council. He acquired immense wealth, and was twice married, the second time, in 1631, to a lovely girl of 16. Rubens, beyond all comparison, was the most rapid in execution of all the great masters, and was incontestably the greatest perfecter of the mechanical part of his art that ever existed. His works are very numerous, and very diversified in subject. There are nearly 100 in the Picture Gallery at Munich. "The Descent from the Cross," at Antwerp, is perhaps his masterpiece. It is a composition remarkably similar to the fine fresco of the same subject painted by Daniele di Volterra in the preceding century. He died in Antwerp, May 30, 1640.

Rubia

The 300th anniversary of Rubens's birth was held at Siegen in 1877.

Rubia, in botany, madder; the typical genus of *Rubiaceæ*, or a genus of *Galiaceæ*. Corolla rotate, campanulate, or funnel-shaped, four to five cleft, stamens four or five, fruit a two-lobed berry. About 50 species are known, chiefly from temperate regions. *R. tinctoria* is madder. From *R. cordifolia*, called also *R. munjista*, come the roots called munjeeth. *R. sikkimensis* yields a dye. *R. relboun* is the madder of Chile. The roots of *R. augustinissima* are also highly colored. *R. noxa* is said to be poisonous. See MADDER.

Rubiaceæ, an order of plants founded by Jussieu in 1789; monopetalous plants, with opposite leaves, interpetiolar stipules; stamens inserted in the tube of the corolla, and alternating with its lobes; ovary inferior, compound. Lindley separated it into *Galiaceæ* and *Cinchonaceæ*. Sir Joseph Hooker recurs to the old arrangement.

Rubicon, a river in North Italy (now the Fiumicino, a tributary of the Adriatic), famous in Roman history, Cæsar having by crossing this stream (49 B. C.), at that time regarded as the N. boundary of Italy, finally committed himself to the civil war. Hence the phrase "to pass the Rubicon" is to take the decisive step by which one commits one's self to a hazardous enterprise.

Rubidium, a metal much resembling cæsium, with which it was discovered in 1860, by Bunsen and Kirchhoff, during the analysis of a spring of water which contained these metals in minute quantities. Rubidium has since been found in small quantities in other mineral waters, in lepidolite, and in the ashes of many plants. This metal is closely related, in properties, to potassium, but is more easily fusible and convertible into vapor, and actually surpasses that metal in its attraction for oxygen, rubidium taking fire spontaneously in air. It burns on water with exactly the same flame as potassium. Its oxide, rubidia (RbO), is a powerful alkali, like potash, and its salts are isomorphous with those of pot-

Rubinstein

ash. The double chloride of platinum and potassium, however, is eight times as soluble in boiling water as the corresponding salt of rubidium, which is taken advantage of in separating these two allied metals. At. wt. 85.4; symbol Rb.

Rubinstein, Anton Gregor, a Polish musician; born near Jassy, Rumania, Nov. 28, 1829. He was trained to music in Moscow by his mother and a master. Liszt heard him, "an infant prodigy," play in Paris in 1841, recognized his genius, and



RUBENS AND ELIZABETH BRANT.

encouraged him to play in other cities. After some further "touring" he gave himself to serious study in Berlin and Vienna, and in 1848 settled in St. Petersburg as teacher of music. In 1854 he made another musical tour, with the reputation of being a second Liszt and "the coming" composer. On his return to St. Petersburg he succeeded in getting a musical conservatory founded (1862) there and became its director. But his concert tours engrossed a good deal of his time, and in 1867 he resigned the

directorship of the conservatoire. In 1872 he went to the United States and had an enthusiastic reception. He ended his concert tours in 1886. He was induced in the following year to resume the directorship of the conservatory at St. Petersburg. From the Russian government he received a patent of nobility and other honors.

He was a strongly pronounced opponent of the principles of Wagner. As a pianist



ANTON RUBINSTEIN.

he held the highest rank, being usually reckoned the greatest since Liszt.

Among his best musical productions are the operas: "The Maccabees," "The Demon," "Feramors" (the libretto from Moore's "Lalla Rookh"), and "Kalaschnikoff"; the two symphonies: "Ocean" and "Dramatic"; and the sacred operas: "Paradise Lost," "The Tower of Babel," and "Sulamith." His numerous songs and pieces of chamber music are highly esteemed and more widely known. He wrote his "Autobiography" (1829-1889) and "Conversation on Music." He ceased playing in public some time before his death, which occurred in Peterhof, Russia, Nov. 20, 1894.

Rubric, in the language of the old copies of MSS. and of modern printers, any writing or printing in red ink; the date and place in a title-page being frequently in red ink, the word rubric has come to signify the false name of a place on a title-page. Thus, many books printed at Paris bear the rubric of London, Geneva, etc.

In law, the title of a statute; so called as being formerly written in red characters. Also, in MS. missals, the directions prefixed to the several prayers and offices formerly written in red;—hence, an ecclesiastical or episcopal injunction; also the rubric familiarly signifies the order of the liturgy in the Roman Catholic and Protestant Episcopal Churches. Hence, that which is definitely fixed or authoritatively established; as, the rubric of the planetary system.

Rubruquis, William of, a mediæval traveler; born in Rubrouck, in Northern France, early in the 13th century. He entered the Franciscan order, and was sent by Louis IX. of France into Central Asia for the purpose of opening up communications with Sartak, the son of the Mongol prince, Batû Khan, a supposed Christian. Friar William traveled (1253) by way of Constantinople across the Black Sea and the Crimea to the Volga. Sartak referred him to his father, Batû, and that prince sent him forward to the Mongol emperor, Mangû Khan, whom he found Dec. 27, about 10 days' journey S. of Karakorum in Mongolia. With that sovereign he remained till July, 1254, then returned to the Volga, penetrated the defiles of the Caucasus, proceeded through Armenia, Persia, and Asia Minor to Syria, and arrived at Tripoli in August, 1255. King Louis had meanwhile returned to France, and Friar William wrote him the account of his journey which has come down to us. The best edition is that of D'Avezac in "Review of Travels" (1839), of the Paris Geographical Society. Of the later history of Rubruquis the only fact known is that he was living in 1293 when Marco Polo was returning from the East.

Rubus, a genus of *Potentillidæ* (Lindley); of *Rubææ* (Sir Joseph Hooker); creeping herbs or sarmentose shrubs, almost always prickly; flowers in panicles or solitary, white or red; calyx five-cleft; petals five; style short, subterminal. Fruit of several single-seeded juicy drupes, in a protuberant fleshy receptacle; known species about 100, chiefly from the north temperate zone. In North America the leaves of *R. villosus* are employed as an astringent. The leaves of *R. arcticus* have been used as a substitute for tea. Several Himalayan species or sub-species have edible fruits.

Ruby, a term applied popularly to two distinct minerals—the pyrope and the spinelle ruby, both of which are much valued as gems. The pyrope is a silicate of magnesia and alumina, with varying admixtures of iron, chromium, manganese, and lime. It occurs chiefly at Zöblitz, in Saxony; at Mittelgebirge, in Bohemia; and at Elie, in Scotland. The spinelle ruby and its varieties, the orange-red rubicelle, and the violet or brown almandine, are aluminates of magnesia, with different proportions of iron and chromium. They mostly occur in Ceylon at Ava and in other parts of the East Indies. Rubies are wonderfully imitated.

In trade three classes of rubies are distinguished—rubies of the Orient, rubies of Siam, and spinel rubies. The different varieties called balass rubies, Brazil rubies, rose rubies, rubace rubies, rock rubies, Siberian rubies, etc., cannot be compared at

Ruby

all with the preceding, of which they have neither the composition nor the constitution. Apart from the balass ruby, which from a scientific viewpoint does not differ from the spinel ruby, all the others are, properly speaking, only colored quartz or felspar. The ruby of the Orient is the first of all colored stones in beauty, as in price. Its marvelous hue is that of the human blood as it jets from an open artery, that of the red ray of the solar spectrum at its maximum intensity.

The ruby is one of the most exquisite products of nature, but it is becoming rare and more rare to find it perfect. It even causes astonishment to find an Oriental ruby as large in size as the topazes and sapphires of the same countries. If it reaches a certain size it is almost always filled with defects. Rubies of all sizes are put to use. The smallest down to 20 or 30 to the carat are employed specially for delicate jewels, for numbers, figures, etc. Many of the smallest are cabochons. When a ruby exceeds the weight of a carat it commands a high price. A ruby may fetch 10 or 20 times the price of a diamond of the same weight if it is really of a superior quality. In general the cutting as a brilliant is alone suitable for a fine ruby. The ruby is very hard, almost as hard as the sapphire. It was but little used for engraving in ancient times, doubtless because of the difficulty of finding those offering a sufficient surface, a reason more plausible than the explanation that the wax adhered to seals made of this substance. The two engraved rubies seen at the Mineralogical Museum of the Garden of Plants prove that successful work of this kind is well-nigh impossible.

The carbuncle, to which the ancients attributed fantastic properties, was no other than the ruby. It served, it is said, to give light to certain large serpents or dragons whose sight had been enfeebled by age; they bore them constantly between their teeth, and laid them down only for eating and drinking. It is even claimed that the carbuncle emitted light in darkness and that the thickest clothing could not stop its rays. Without all the exaggeration of such legends, it was believed for a long time that rubies contained luminous rays. The truth is that they have double refraction and send out the red rays with unequalled brilliancy. Traversed in a vacuum by an electric current they are illuminated with a red fire of extreme intensity. The greatest heat does not change their form or their color.

The most beautiful rubies come from Ceylon, India, and China. There are mines in Burma which supply at least one-half of the world's production. The Burmese mines were reopened in 1900 under a London company. The mines of Pegu

Ruby Throat

are nearly exhausted, or but little worked today. The regions where they are situated are dangerous of approach; besides, in the States of the Grand Mogul, the exportation of rubies is forbidden till they have been exhibited to the sovereign, who retains the most beautiful. The stone known under the name of the ruby of Siam is distinguished by its deep red color, somewhat resembling the garnet. But there is no need of being a connoisseur to note the difference between the ruby of Siam and the garnet.

The spinel ruby is much less rich in color, and contrasts visibly in tone with the other kinds. It is of a bright, poppy red. It is much less rare, especially of large size, and is not so hard. It is found in the same countries, in the midst of deposits of alluvium in the beds of the torrents. The finest come from Pegu and Cambay. The balass is a very inferior quality of the spinel, the color of which approaches a wine red or clear violet. It is cut with facility, but much skill is required for its polish. It is generally of little value, though large sums are paid for some balass rubies. A beautiful specimen belonging to the treasury of the crown cost 10,000 livres.

The large rubies of the Orient, being excessively rare, are so much the more celebrated. The largest known in Europe is said to be the one that the Russian caravans brought from China with other precious stones in exchange for their peltries, and which forms today one of the rarest ornaments of the imperial court of Russia. The one of which Chardin speaks with admiration was a cabochon, was of splendid color, and bore engraved the name of the Sheik Lephy. That of the King of Persia, of which Tavernier made a drawing, weighed 175 carats. That of the King of Visapour, a cabochon, brought in 1653 nearly \$15,000. The one possessed by Gustavus Adolphus was as large as a small egg, and of the most beautiful water. It was presented to the czarina on the occasion of his visit to St. Petersburg in 1677.

It is seen by the inventory of 1791 that France possessed 81 Oriental rubies, of diverse forms and qualities. One of them remained for a long time in a rough state, in consequence of two or three points which could not be removed without sensibly diminishing the value of the stone; but a diamond artist was able to put these defects to use and transformed the rough stone into a dragon with outstretched wings. This is the most beautiful Oriental ruby known.

Ruby Tail, the *Chrysis ignita*; the common gold wasp.

Ruby Throat, the *Trochilus colubris*, a species of humming bird, so named from the brilliant ruby red color of its chin and throat. In summer it is found in all parts

Rückert

of North America, up to lat. 57° N., being thus remarkable for its extensive distribution.

Rückert, Friedrich, a German poet; born in Schweinfurt, Bavaria, May 16, 1788; was educated there and at Würzburg.



FRIEDRICH RÜCKERT.

For some years he led a wandering life, studying philology and poetry. During this period of his life he helped Arndt and Theodor Körner to fan the flame of German patriotism by his "German Poems" (1814), especially by the "Armor-Clad Sonnets" included in this volume. From 1826 to 1841 he filled the chair of Oriental languages at Erlangen; but the greater part of his summers were passed at the country seat of his wife's parents, "Neuses" near Coburg. In 1841 Frederick William IV. invited him to Berlin, making him Professor of Oriental Languages; but the poet preferred his idyllic life at "Neuses" and went back there in 1848. After learning Persian, Arabic, and Turkish he recast in German verse, with great skill, several of the famous books of the East, as "The Transformation of Abu Seid" of Hariri (1826), "Nala and Damayanti" from the Mahābhārata (1828); "Rustam and Schrab" from Firdausi (1838); "Amrīlkais" (1843); "Hamasa" (1846), a collection of Arabic folk-songs, and others. His most popular books are the collection of lyrics entitled "Springtime of Love" (1844; 14th ed. 1888) and the reflective poems gathered together as "The Wisdom of the Brahman" (1836-1839; 12th ed. 1886). His posthumously published work includes German adaptations of Theocritus, Aristophanes, Kālidāsa's "Sākuntala" (1867), Sādi's "Bostān" (1882), and a good deal of original poetry. He died in Neuses, Jan. 31, 1866.

Rückert, Heinrich (rük'ert), a German historian, son of Friedrich; born in Coburg, Feb. 14, 1825. His works include the monographs: "Life of St. Louis, Landgrave of Thuringia" (1850), and "Brother Philip, of the Order of the Chartreux" (1855);

Rudel

also "Annals of German History" (1850); "History of the Middle Ages" (1852); and "History of German Civilization at the Period of Transition from Pagan to Christian Times" (1853-1854). He died in Breslau, Sept. 11, 1875.

Rudd. See RED-EYE.

Rudder, primarily, an oar; specifically, the instrument by which a ship is steered, being that part of the helm which consists of a piece of timber which enters the water, and is attached to the sternpost by hinges, on which it turns. The action of the rudder may be thus explained: While it remains in line with the keel, the force of the water gliding past the deadwood, or narrow portion of the stern, is equal on both sides of the rudder, and equilibrium is maintained; but if the rudder be forced to one side the pressure is taken off on the opposite side, while from acting at a less angle the water exercises an increased pressure on the side to which the rudder is turned. The effect is to force the stern round on the center of gravity as a pivot, the ship's head, of course, turning to the same side as that on which the rudder is. When the head has sufficiently deviated from its former line the rudder is permitted to resume its straight position. In sailing *on a wind*, the rudder is kept permanently on one side to counteract the tendency to make leeway. The word is also applied, analogically, to anything which resembles a rudder in guiding or governing properties.

Rudder Fish, *Caranx Carangus*; a fish allied to the mackerel, very common in the Atlantic and Pacific Oceans, so named from its habit of swimming around the sterns of ships, attracted, doubtless, by the refuse thrown overboard. The flesh is said to be coarse in flavor.

Ruddiman, Thomas, a Scotch scholar; born in Boyndie, Scotland, in October, 1674. He was graduated at Aberdeen University in 1694, and became schoolmaster at Laurencekirk. About 1700 he removed to Edinburgh, where he obtained the post of assistant in the Advocates' Library. He won recognition as one of the leading scholars of the day. His best-known work is his famous "Rudiments of the Latin Tongue" (1714), a book which immediately superseded all previous treatises of a similar kind, and long remained in use in the schools of Scotland. In 1715 he edited the first collected edition of George Buchanan's works. He died in Edinburgh, Jan. 19, 1757.

Rudel, Gauffre, or **Godefroy**, Prince of Blaye (rü-del'), a French troubadour of the 12th century, who attached himself to the suite of Geoffrey, Count of Bretagne, son of Henry II. of England. He went to Syria in search of a fair countess of Tripoli,

Rudini

rumors of whose beauty had reached him; and was so overcome when he finally saw her and heard her voice that he fell dead at her feet. She buried him with great pomp and retired to a convent to mourn him all her days. Petrarch makes mention of Rudel; and several bits of verse by him are extant in the MSS. of Provençal literature, now in the great libraries of Paris, Venice, and Rome. One of them has been published by Raynouard, as the "Gem of the Original Poems of the Troubadours."

Rudini, Antonio Starrabba, Marchese di, an Italian statesman; born in Palermo, Sicily, in 1839. He became prominent as mayor of Palermo, where he vigorously suppressed an insurrection. Though an aristocrat, he sided with Garibaldi. In 1869 he was minister of the interior and member of the Chamber of Deputies, serving in the Parliament till called to succeed Crispi as premier, Feb. 7, 1891. During the Mafia difficulty in New Orleans he recalled the Italian minister from Washington to enforce his demands on the United States government. He succeeded Crispi in 1891, was succeeded by Crispi in 1892, and was again made premier in 1896, when disasters to the Italian army in Abyssinia caused Crispi's fall. His third term of office closed June 29, 1898. He died Aug. 7, 1908.

Rudolf I., or Rudolph, founder of the present imperial dynasty of Austria; born in Limburg castle in the Breisgau, Germany, May 1, 1218. He became a warm partisan of Frederick II., distinguished himself in arms, and spent much of the early years of his manhood in quarrels with the bishops of Basel and Strasburg. His possessions were greatly increased by inheritance and by his marriage, till he was the most powerful prince of Swabia. In 1273 the electors chose him to be German king; as, never having been crowned by the Pope, he was not entitled to be called kaiser or emperor. His accession was opposed by none; the Pope's consent was secured at the price of certain rights already parted with by Rudolf's predecessors. Ottocar of Bohemia, rebelling against him, was defeated and slain in 1278 at Marchfeld beside the Danube. Rudolf spent the greater part of his life that remained in suppressing the castles of the robber knights and putting an end to their lawless practices. He died in Spires, July 15, 1291, and was buried in the cathedral there.

Rudolf II., eldest son of the Emperor Maximilian II.; born in Vienna, July 18, 1552; he was educated at the Spanish court by the Jesuits; made King of Hungary in 1572, King of Bohemia, with the title King of the Romans, in 1575, and on the death of his father in 1576 succeeded to the imperial crown. Gloomy, taciturn, bigoted,

Rudolf II.

indolent both in body and mind, he put himself in the hands of the Jesuits and low favorites and left the empire to govern itself. His attention was given to his cu-



EMPEROR RUDOLF II.

riosities, his stable, his alchemical and magical studies; nevertheless his taste for astrology and the occult sciences, and his desire to discover the philosopher's stone,



RUE.

made him extend his patronage to Kepler and Tycho Brahé. The astronomical calculations begun by Tycho, and continued by Kepler, known as "The Rudolphine Tables," derive their name from this emperor. Meanwhile the Protestants were bitterly persecuted by the Jesuits throughout the empire;

Rue

the Turks invaded Hungary and defeated the Archduke Maximilian (1596); Transylvania and Hungary rose in revolt; and at last Rudolf's brother Matthias wrested from him the crowns of Hungary and Bohemia, and the states of Austria and Moravia. Less than a year after losing the crown of Bohemia he died, unmarried, Jan. 20, 1612, and was succeeded by Matthias.

Rue, the genus *Ruta*. The common rue is *R. graveolens*, a half-shrubby plant, two or three feet high, of a fetid odor and an acrid taste. The bluish green leaves are pinnate, the flowers yellow, the first that comes forth generally having 10 stamens, the next eight; a native of Southern Europe, but grown in gardens in the East and West Indies, the United States, etc. Rue oil is a powerful topical stimulant, an antispasmodic, an emmenagogue, and perhaps an anthelmintic. It is used internally in flatulent colic, hysteria, epilepsy, etc., and as an enema, and externally as a rubefacient. It has been used also, from ancient times, for culinary purposes.

Ruff, the *Machetes pugnax*, a bird that is a spring and summer visitor in North Europe, having its winter home in Africa. It is rather larger than a snipe; general plumage ash-brown, spotted or mottled with black, but no two specimens are alike. In the breeding season the neck is surrounded by a frill or ruff of numerous long black



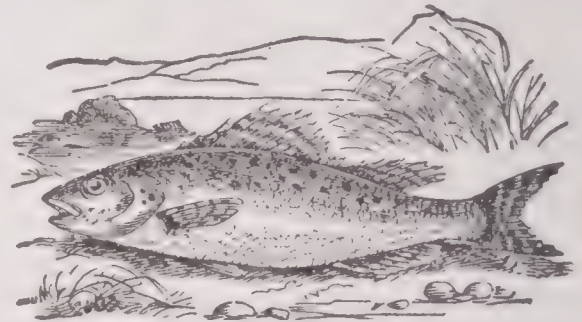
THE RUFF.

feathers, glossed with purple, and barred with chestnut. While probably serving primarily as an attraction to the hen birds, this frill acts also as a shield, for the polygamous ruffs are intensely pugnacious, and furious battles take place between them for the possession of the females, which are called reeves, and are more uniform in coloration and smaller than the males. The nest is usually of coarse grass, in a moist, swampy place; the eggs four in number.

Rugby

Also a breed of the Jacobin. The feathers fall more backward off the head, and lie in a rough and confused manner, whence the pigeon has its name.

Ruffe, in ichthyology, the *Acerina cernua*, from the rivers of Europe. It is olive-green, marbled and spotted with brown, and



THE RUFFE.

resembles the perch in habits. The name is said to be derived from the harsh sensation caused by its ctenoid scales.

Ruffed Grouse, *Bonasa umbellus*, a North American species of grouse of the same genus as the hazel grouse of Europe. It is named from the tufts of feathers on the sides of its neck, and frequents forests and thickets.

Ruffini, *Giovanni Domenico* (rö-fē'nē), an Italian author; born in Genoa, Italy, in September, 1807. Obligated to flee his native land for political reasons, he resided in France, Switzerland, and England, and later returned to Italy. He published in London his first romance, "Lorenzo Benoni," a sort of autobiography; also "Doctor Antonio" (1858), his best-known book; "Les Paragreens" (1860); "Lavinia" (1863); and others. Many of his works have been translated. He died in Taggia, Italy, Nov. 2, 1881.

Rufiji, or **Lufiji**, a river of Eastern Africa which rises to the N. E. of Lake Nyassa, and enters the Indian Ocean opposite the island of Mafia.

Rugby, a town in Warwickshire, England; 83 miles N. W. of London and 30 E. S. E. of Birmingham. At the foot of the hill on which it stands the Swift gave John Wyclif's ashes to the Avon; close by at Ashby and at Dunchurch the Gunpowder Plot was hatched; the battlefield of Naseby was visited by Carlyle from its school house in 1842, a few days before Arnold's death; it is within a drive of Stratford-on-Avon, Coventry, Kenilworth. It is at once the center of a great hunting district and the seat of a world-famous public school. This probably accounts for the large number of residential houses there. The school was founded in 1567 by Lawrence Sheriff, a grocer and a staunch supporter of Queen Elizabeth, by a gift of property in Manchester Square, London. After maintaining its po-

Rugby

sition for some time as a good school for the Warwickshire gentry and a few others, specially under Dr. James and Dr. Wool, it became of national reputation under Dr. Arnold, who in raising his school raised at the same time the dignity of his whole profession. Since his time the school has never lacked able teachers, remarkable for independence of mind. When Arnold died in 1842, Archbishop Tait succeeded him, having as coadjutors Lord Lingen, Dean Bradley, Principal Shairp, Thomas Evans, Theodore Walrond, Bishop Cotton. He in turn was succeeded by Dean Goulburn, who had as one of his assistants the future Archbishop Benson. The Crimean War reduced the numbers of the school to 300, and Dr. Goulburn resigned in 1857. He was succeeded by the future Bishop of London, Dr. Temple, who remained 12 years. The Public Schools Commission reported of Rugby in his days that the general teaching of classics was absolutely unsurpassed; that Rugby School was the only public school in which physical science was a regular part of the curriculum; that only Harrow had done as much as Rugby in awakening interest in history. Having secured this tribute for his teaching and having collected enough money to rebuild the chapel, to erect a gymnasium and to build new schools, Dr. Temple was succeeded by Dr. Hayman. To him succeeded Dr. Jex-Blake, who inaugurated a still greater building era. When he resigned in 1887 he left behind him a school simply unrivaled in its appointments. He was succeeded by Dr. Percival. Of illustrious Rugbeians may be named the poets Landor, Clough, and Matthew Arnold; Dean Stanley, who had the rare privilege of recording the work of his great head-master in biography; Judge Hughes, who did the same equally felicitously in "Tom Brown's School Days"; Dean Vaughan, Lord Derby, Lord Cross, Mr. Goschen, Sir R. Temple, Franck Bright, and York Powell the historians, Justice Bowen, Sir W. Palliser, Professor Sidgwick, Robinson Ellis, and Arthur Sidgwick, C. Stuart-Wortley, and Arthur Acland. From Rugby went the first head-master to Marlborough, Wellington, Clifton, Haileybury, Fettes College, and Newcastle High School. Mission work found its Rugby worker in Fox, in whose memory the school still keeps up a missionary at Masulipatam. The author of "Gothic Architecture," Matthew H. Bloxam, was taught and lived at Rugby, where he died in 1888, leaving his valuable collection of antiquities and books to the school. The school possesses an observatory, given by Archdeacon Wilson, and the "Natural History Reports," written by members of the school, have often been of exceptional value.

Rugosa

Rugby, a former town in Morgan co., Tenn.; about 141 miles N. of Chattanooga; on the Cumberland plateau; is in a rich mining and agricultural region. It owes its existence to a series of public lectures delivered in the United States by Thomas Hughes of England. It was settled by a company from England in 1880, who bought a large tract of land, and the settlement was made with impressive ceremonies. The town was laid out in building sites, farms, parks, etc.; several industries were introduced, but the scheme never realized the expectations of its projectors; and the place is now only classed as a health resort.

Ruge, Arnold, a German publicist; born in Bergen, Island of Rügen, Prussia, Sept. 13, 1802 or 1803. He embraced the doctrines of Hegel, and wrote philosophical criticisms in the Halle Year Book. He joined Karl Marx in Paris, and published with him the "German-French Year Books" (1843-1845). After the suppression of the paper which he started in Berlin, called "Reform," he went to London and formed, in connection with Ledru-Rollin and Mazzini, the European Democratic Committee. Among his works are: "Two Years in Paris" (1845); "Poetic Pictures" (1847); "Political Pictures" (1848); "Our System" (1850); "In Former Times" (1862-1867); and "Manifesto of the German People." He died in Brighton, England, Dec. 31, 1880.

Rügen (rū'gĕn), an island in the Baltic Sea, belonging to Prussia, near the coast of Pomerania; area, 377 square miles; exceedingly irregular in shape. The surface is fertile, undulating, and in many places covered with beautiful beech forests. The Stubbenkammer, a sheer chalk cliff (400 feet high) at the N. E. extremity, is frequently visited. The capital is Bergen. Many of the coast villages are popular sea-bathing resorts. From 1648 till 1815 Rügen belonged to Sweden. Pop. (1900) 46,270.

Ruger, Thomas Howard, an American military officer; born in Lima, N. Y., April 2, 1833; was graduated at the United States Military Academy in 1854; studied law and practised in Janesville, Wis., in 1855-1861; became lieutenant-colonel of the 3d Wisconsin regiment in June, 1861; won distinction in numerous engagements during the Civil War; suppressed the draft riots in New York city in 1863; was brevetted Major-General of volunteers, Nov. 30, 1864; promoted colonel, U. S. A., in 1867; Brigadier-General in 1886; and Major-General in 1895; retired in 1897; died June 3, 1907.

Rugosa, in zoölogy, a group of *Madreporaria*; corallum sclerodermic, with a true theca; generally both tubulæ and septa com-

bined; septa generally some multiple of four, but with one or three prominent, or with a small channel; simple or compound corals represented in the modern seas only by two genera, one from the Mediterranean, the other from Florida. Families: *Stauridæ*, *Cyathaxonidæ*, *Cyathophyllidæ*, and *Cystiphyllidæ*. Also found in the Palæozoic rocks, the Upper Greensand, and the Tertiary. They were reef-builders.

Ruhmkorff, Heinrich Daniel, a German-French inventor; born in Hanover, Germany, in 1803; settled in Paris in 1839; and was the inventor of the famous induction coil bearing his name. He died in Paris, Dec. 21, 1877.

Ruhmkorff's Coil. See INDUCTION COIL.

Ruhr (rör), a river of Prussia, that joins the Rhine at Ruhrort, about 19 miles N. of Düsseldorf. It rises in Westphalia, and has a tortuous course of about 200 miles, latterly through the Ruhr coal field region.

Ruiz, Juan (rö-ëth'), a Spanish poet of the 14th century, known as "Archpriest of Hita"; born in Alcala or Guadalajara in 1300. He is the most original of mediæval Spanish poets, and has left a poem on love and women which is in reality a text-book for the man who wishes to become a successful lover. It is interspersed with songs, the best of which are the "Song of Scholars" and "Song of the Blind." He died about 1351.

Rukh. See Roc.

Rule, St. See REGULUS.

Rule Nisi, or Rule to Show Cause, in English and United States law, an order granted by the court on an interlocutory application (formerly always *ex parte*), directing the party opposed to the applicant to do or abstain from some act, unless (*nisi*) he can show cause why the order should not be obeyed. If cause is shown, the order is "discharged," otherwise it is made "absolute," and the party ruled must obey on pain of attachment for contempt.

Rulhière, Claude Carloman de la (rül-yär'), a French historian and poet; born in Bondy, near Paris, in 1735. While aide-de-camp to Richelieu he composed his "Discourse Upon Disputes," a witty poem which Voltaire inserted in his "Philosophic Dictionary." In 1771 he was named political writer to the minister of foreign affairs, and visited London and Poland in that capacity. His historical works are noted for their strict honesty and justice, and his poetry for its ease and freedom of expression. He excels in short tales and epigrams. His historical works include: "Explanations of the Causes of the Revocation of the Edict of Nantes" (1788); "Anecdotes of the Russian Revolution in 1762" (1797); and

"History of the Anarchy of Poland" (4 vols. 1807; 4th ed. 1862), his finest work. His poetry includes "Rough Play" (1808), and many small fragments. He died in Paris, Jan. 30, 1791.

Rules of the Road at Sea, the designation of regulations adopted by national or international authorities for the management of vessels in storms, fogs, or other danger. Under act of the United States Congress, in 1896, the rules already established were considerably changed to comport with the schedule to be observed by vessels of all civilized nations on and after July 1, 1897. These rules apply also to inland waters, excepting the Great Lakes, for which a special set has been devised. The following is a synopsis of the new rules: "Vessels are in the first place cautioned against showing any other lights than their distinguishing ones in such a way as to permit any possibility of confusion. An additional white light is, however, given to a steam vessel under way to be carried at least 15 feet lower than the one now provided for, and forward of its vertical line. A vessel which is towing another vessel or barge is also allowed a small white light to be carried aft, and in such a position that it shall not be visible forward of the beam, which may be used for the towing vessel to steer by. The following regulations are also provided for small vessels: First — Steam vessels of less than 40 tons shall carry — (a) In the fore part of the vessel, or on or in front of the funnel, where it can best be seen, and at a height above the gunwale of not less than nine feet, a bright white light constructed and fixed as prescribed in article two (a), and of such a character as to be visible at a distance of at least two miles. (b) Green and red side lights constructed and fixed as prescribed in article two (b) and (c), and of such a character as to be visible at a distance of at least one mile, or a combined lantern showing a green light and a red light from right ahead to two points abaft the beam on their respective sides. Such lanterns shall be carried not less than three feet below the white light. Second — Small steamboats, such as are carried by seagoing vessels, may carry the white light at a less height than nine feet above the gunwale, but it shall be carried above the combined lantern mentioned in subdivision one (b). Third — Vessels under oars or sails of less than 20 tons shall have ready at hand a lantern with a green glass on one side and a red glass on the other, which, on the approach of or to other vessels, shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side. Fourth — Rowing boats, whether under oars or sail, shall have

ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision. Additional regulations are provided for pilot vessels on duty at their stations as follows: On the near approach of or to other vessels they shall have their side lights lighted, ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side, nor the red light on the starboard side. A pilot vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may instead of the colored lights above mentioned, have at hand, ready for use, a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above. A vessel in or near a fair-way, when aground, is required to carry in addition to it, the two red lights which signify a vessel not under control but not desiring assistance. A steam vessel under sail only, but having her funnel up, shall carry forward where it can best be seen, one black ball or shape, not two feet in diameter. The manner of fog signaling is also more definitely fixed as follows: Article 15. All signals prescribed by this article for vessels under way shall be given: First—By “steam vessels” on the whistle or siren. Second—By “sailing vessels” and “vessels towed” on the fog horn. The words “prolonged blast” used in this article shall mean a blast of from four to six seconds’ duration. (a) A steam vessel having way on her shall sound, at intervals of not more than two minutes, a prolonged blast. (b) A steam vessel under way, but stopped, and having no way on her, shall sound, at intervals of not more than two minutes, two prolonged blasts, with an interval of about one second between. (c) A sailing vessel under way shall sound at intervals of not more than one minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession. (d) A vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for above five seconds. (e) A vessel when towing a vessel employed in laying or in picking up a telegraph cable, and a vessel under way, which is unable to get out of the way of an approaching vessel through being not under command, or unable to maneuver as required by the rules, shall instead of the signals prescribed in subdivisions (a) and (c) of this article, at intervals of not more than two minutes, sound three blasts in succession, namely, one prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any

other. Sailing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals, but, if they do not, they shall make some other efficient sound signal at intervals of not more than one minute.”

Ruling Machines, instruments used for ruling paper, metal, etc. The first machine of this kind was invented by a Dutchman, resident in London, in 1782, and was subsequently greatly improved by Woodmason, Payne, Brown, and others. F. A. Nobert devised a ruling machine in 1845 for the production of microscopical test plates, diffraction gratings, and micrometers, etc., and more recently Benjamin Day, a New York artist, patented one for use by artists.

Rum, a spirit distilled chiefly in the West Indies from the fermented skimmings of the sugar-boilers and molasses, together with sufficient cane juice to impart the necessary flavor. Its peculiar flavor is due to butyric ether. Caramel is added for coloring. Much of the rum sold is merely plain spirit colored with burned sugar and flavored with rum flavoring. The Medford rum manufactured in Massachusetts is largely exported to Africa.

Rum, a mountainous island of Argyllshire, Scotland, belonging to the group of the Inner Hebrides, 15 miles N. by W. of Ardnamurchan Point. It is $8\frac{1}{2}$ miles long, 8 miles broad, and 42 square miles in area, only 300 acres being arable, and the rest deer forest and moorland. The surface presents a mass of high sharp-peaked mountains, rising in Halival and Haiskeval to the height of 2,368 and 2,659 feet. In 1826 the crofters, numbering fully 400, were, all but one family, cleared off to America, and Rum was converted into a single sheep farm; but in 1845 it was sold (as again in 1888) for a deer forest.

* **Rumania**, a European kingdom, bounded by Austria-Hungary, Servia, Bulgaria, the Black Sea, and Russia; area, 50,720 square miles; pop. (1907), including the Dobruja, 6,684,265. It includes the former Danubian principalities of Walachia and Moldavia and the province of Dobruja on the Black Sea (pop. est. 200,000). The capital is Bucharest; other chief towns are Jassy, Galatz, Braïla, and Giurgevo.

Topography.—The surface is mainly occupied by undulating and well-watered plains of great fertility, gradually sloping upward to the Carpathians on the N. and W. borders, where the summits range from 2,650 to 8,800 feet above sea-level. The entire kingdom is in the basin of the Danube, which has a course of 595 miles in Rumania, forming the boundary with Bulgaria nearly the whole way. Its chief Rumanian tributaries are the Olta or Aluta,

* For Map, see TURKEY.

Rumania

Ardjis, Jalomitza, Sereth, and Pruth (on N. W. border). The Danube forms a number of marshy lakes as it approaches the alluvial region of the Dobruja, through which it discharges itself into the Black Sea by the St. George, Sulina, and Kilia channels. The climate is much more extreme than at the same latitude in other parts of Europe; the summer is hot and rainless, the winter sudden and very intense; there is almost no spring, but the autumn is long and pleasant. Rumania is an essentially agricultural and pastoral state, fully 70 per cent. of the inhabitants being directly engaged in husbandry. The chief cereal crops are maize, wheat, barley, rye, and oats; tobacco, hemp, and flax are also grown; and wine is produced on the hills at the foot of the Carpathians. Cattle, sheep, and horses are reared in large numbers. Excellent timber abounds on the Carpathians. Bears, wolves, wild boars, large and small game, and fish are plentiful. The country is rich in minerals of nearly every description, but salt, petroleum, and lignite are the only minerals worked. Manufactures are still in a rudimentary state.

Commerce, Etc.—Trade is fairly active, but is almost entirely in the hands of foreigners; the internal trade is chiefly carried on by Jews, whose numbers and prosperity are constant sources of anxiety to Rumanian statesmen, and who are in consequence subject to certain disabilities. The chief exports are grain (especially maize), cattle, timber, and fruit; the chief imports, manufactured goods, coal, etc. Germany, Great Britain, and Austria-Hungary appropriate by far the greatest share of the foreign trade, the bulk of which passes through the Black Sea ports. In 1898 the exports were valued at \$56,636,314, the imports \$77,981,688. In 1899 there were 1,895 miles of state railway. The government monopolizes also salt and tobacco. The French decimal coinage has been introduced, the franc being called *leu* (pl. *lei*), the centime *bani*. The metric system of weights and measures has also been officially recognized, but a bewildering diversity of local standards is still common.

People.—The Rumanians, who call themselves *Romani*, claim to be descendants of Roman colonists introduced by Trajan; but the traces of Latin descent are in great part due to a later immigration, about the 12th century, from the Alpine districts. Their language and history both indicate that they are a mixed race with many constituents. Their language, however, must be classed as one of the Romance tongues, though it contains a large admixture of foreign elements. In Rumania there are about 4,500,000 Rumanians, 300,000 Jews, 200,000 gipsies, 50,000 Bulgars, 1,500 Magyars, 20,000 Germans, 20,000 Greeks,

Rumania

and 15,000 Armenians. Three-fourths of the population are peasants, who till 1864 were kept in virtual serfdom by the boiars or nobles. In that year upward of 400,000 peasant families were made proprietors of small holdings averaging 10 acres, at a price to be paid back to the State in 15 years. About 4,500,000 of the people belong to the Greek Church. Energetic efforts are being made to raise education from its present low level. Rumania has two universities (at Bucharest and Jassy), several gymnasia, and a system of free primary schools, at which attendance is compulsory.

Government.—Rumania is a hereditary constitutional monarchy with a bicameral Legislature. The Senate consists of various dignitaries and officials and 120 elected members; the Chamber of Deputies has 183 members, elected by all citizens paying taxes or possessed of a certain standard of education. The constitution, last revised in 1884, closely resembles that of Belgium. The king is assisted by a ministry of eight members. The army is modeled on the German system, service being compulsory from the age of 21 to 46. The standing army has a peace strength of 3,280 officers and 60,000 men, with 390 guns. In addition are the territorial army (72,000 men) and 7,500 horses. The war strength is put at 3,948 officers, 168,000 men, and 32,604 horses. The navy consists of 23 vessels, mostly small. The budget estimates for 1900–1901 were: Revenue, \$48,519,800; expenditure the same. In 1899 the public debt was \$256,143,937, more than one-half of which was incurred for railways and other public works.

History.—The country that is now Rumania was anciently part of Dacia, which was conquered by Trajan and made a Roman province in A. D. 106, a great many Roman colonists being then settled in it. In the 3d century it was overrun by the Goths, and subsequently by Huns, Bulgars, Avars, and Slavs, all of whom have left more or less distinct traces on the land and people. At the beginning of the 9th century Rumania formed part of the great Bulgarian kingdom, after the fall of which in 1019 it nominally belonged to the Eastern Roman empire, though soon taken possession of by Turkish tribes. Walachia and Moldavia were long divided. About 1241 Radu Negra, "Duke" of Fogaras, is said to have founded a voivodeship in Walachia, which finally fell under Turkish supremacy after the battle of Mohacs in 1526. The boiars retained the nominal right of electing the voivodes till 1726; but thenceforward the Sultan openly sold the office to the highest bidders, who, without security of tenure, mercilessly plundered the unfortunate province so long as their power lasted. In Moldavia, Dragosh or Bogdan, about 1354, founded a kingdom, much as Radu had done

in Walachia, and it too fell under the overlordship of the Porte after the death of the voivode, Stephan the Great, in 1504. The Turks subsequently introduced the same custom of selling the hospodarship or voivodeship. In both provinces the government was most frequently purchased by Phanariotes, Greek inhabitants of the Phanar district of Constantinople. The successive wars between Russia and Turkey, the first of which began in 1768, were on the whole beneficial to Rumania, for the Russians gradually established a kind of protectorate over their fellow-Christians on the Danube. The treaty of Paris in 1856, after the Crimean War, confirmed the suzerainty of the Porte, but preserved the rights and privileges of the Danubian principalities, and added to them part of Bessarabia. In 1858 the two provinces, each electing Colonel Couza as its hospodar, were united by a personal union which in 1861 was formally converted into a real and national union. Couza, who assumed the title of Prince Alexander John I. in 1860, was forced by a revolution to abdicate in 1866, and Prince Charles of Hohenzollern-Sigmaringen, the present Carol I., was elected in his place. In the Russo-Turkish War of 1877-1878 Rumania sided with Russia and proclaimed its independence of Turkey. This claim was recognized by the treaty of Berlin in 1878, but Rumania was compelled to retrocede to Russia the part of Bessarabia which it acquired at the close of the Crimean War, and to receive the Dobruja in exchange. In 1881 the principality declared itself a kingdom.

Rumelia, East. See BULGARIA.

Rumex, dock; a genus of *Polygonæ*; sepals six, the three inner ones enlarging; petals none; stamens six, styles three, stigma multifid; achene triquetrous, covered by the enlarged inner sepals, the latter often tuberculate. There are about 50 known species; generally distributed.

Rumford, Benjamin Thompson, Count, an American scientist; born in Woburn, Mass., March 26, 1753. Being a Tory in sympathy, he lived in London during the American Revolution. After serving England for a time, he entered the service of the Elector of Bavaria, rose to the position of Minister of War, and was finally created a count of the Holy Roman Empire. He took the title Rumford from the village of that name (now Concord, N. H.), where he had married. He spent the last years of his life at Auteuil, busily engaged in scientific researches—particularly on the nature and effects of heat, studies with which his name is generally associated. As an administrator, military or civil, he showed immense practical capacity in improving the conditions of life for the lower

ranks. His works include: "Essays: Political, Economical, and Philosophical" (1797-1806); and studies in domestic economy, particularly of cookery. He died in Auteuil near Paris, Aug. 21, 1814.

Rumi, Maulana Jalal-ad-din (rö-mē'), a Persian Sufic poet and philosophic teacher; born in Balkh in Khorāsān, Sept. 30, 1207. His great work is the "Masnawī" or "Mathnawī"—a collection of precepts and tales, interwoven with comments on the Koran and sayings of the Prophet. A versified translation of the first book was published by J. W. Redhouse (1881). He wrote also many spiritual and mystic odes, full of inspiration. His teachings and doctrines are still faithfully adhered to by this order, and studied and revered by the whole Eastern world as the guide to eternal bliss. He died Sept. 17, 1273.

Ruminants, or Ruminantia, a group of herbivorous mammals, belonging to the great order of hoofed or ungulate Mammals, included in the Artiodactyle or "even-toed" section of these, and comprising the five families *Camelidæ* (camel and llama), *Tragulidæ* (chevrotain), *Cervidæ* (true deer), *Camelopardalidæ* (giraffe), and *Bovidæ* or *Cavicornia* (ox, sheep, goat, antelope). The faculty of rumination, though it gives name to this order, is not quite peculiar to it. Ruminants are distinguished from other orders by certain peculiarities of dentition. The most typical of the group, the ox, sheep, antelope, etc., have no incisor or canine teeth in the upper jaw, but have instead a hardened or callous pad against which the six lower incisors bite. In the lower jaw are two canines quite similar to the incisors, and the *Camelidæ* and *Tragulidæ* possess also upper canines. In both jaws are six grinding teeth on either side, separated by an interval from the front teeth. The feet of ruminants are cloven. Horns, developed in pairs, are present in the majority of the species; either solid, as in the antlers of the true deer, or hollow as in the horns of the ox, etc. The alimentary canal is very long. The stomach is divided into four compartments. In young ruminants, which feed on milk, the first three "stomachs" remain undeveloped till the animal begins to take vegetable food. Most of the ruminants are suitable for human food. They are generally gregarious, and are represented by indigenous species in all parts of the world except Australia.

Rumination, the act of chewing the cud. The food of the ruminants is grass, which requires a longer series of chemical changes to convert a portion of it into blood than does the flesh of other animals eaten by the Carnivora. To produce these changes there is a complex stomach divided into four

Rumohr

parts, the rumex or paunch, the reticulum or honeycomb bag, the psalterium or manyplies, and the abomasum or reed. A ruminant does not chew the fodder which it eats, but simply swallows it. When it has had enough it retires to a quiet spot, forces up again to the mouth a portion of the food in its paunch, thoroughly chews it and then swallows it again. Another and another bolus is thus disposed of. Each of these, started from the paunch, is forced next into the honeycomb bag, where it receives its form, and then goes up the gullet. On returning it passes direct from the paunch into the manyplies or third stomach, and thence to the abomasum. Fluids may pass directly into any part of the stomach.

Rumohr, Karl Friedrich Ludwig Felix von (rö'mör), a German author; born near Dresden in 1785. He wrote books on almost every conceivable subject; among them are: "Explanations of Some Assertions Regarding the Wealth of Greece in Objects of Plastic Art" (1811); "Italian Researches" (1826-1831), a profound history of art in Italy; "The Spirit of Culinary Art" (1832); "School of Good Breeding" (1834), and "Researches Upon Maso di Finiguerra" (1841). He died in Dresden, July 25, 1843.

Rumohr, Theodor Wilhelm, a Danish novelist; born in Copenhagen, Aug. 2, 1807. His many romances deal with the national heroes of Denmark, and include: "Jacob Danneford" (1840); "Niels Juel" (1877); and "Peter Tordenskjold" (1877). His collected works appear as "Historical Pictures of the Fatherland" (1863).

Rump Parliament, in English history, the remnant, or fag-end of the Long Parliament, which was assembled on May 6, 1659, and dissolved October 15 in the same year; so called from the general contumely and derision with which it was treated by the English nation at large.

Rumsey, James, an American inventor; born in Bohemia Manor, Cecil co., Md., about 1743; was a machinist by trade, and early turned his attention to improvements in mill mechanisms. He invented and patented a boat "calculated to work with greater ease and rapidity against rapid rivers"; and one to be propelled by the force of a stream of water pumped out at the stern, etc. The Rumsey Society, of which Benjamin Franklin was a member, was founded in 1788 for the purpose of furthering his schemes, a similar society, being founded in England a year later. Rumsey published "A Short Treatise on the Application of Steam" (1788). He died in London, England, Dec. 23, 1792.

Rum Shrub, a liquor prepared with rum, orange and lemon juice and sugar.

Runes

Runcinate, in botany (of a leaf): hook-backed; curved in a direction from the apex to the base, having the points of the great central lobes reflexed, as the leaves of *Taraxacum officinale*.

Rundell, Elizabeth (later **Mrs. Andrew Charles**), an English author; born in Tavistock, England, Jan. 2, 1828. All her writings, whether poems or romances, have a deep religious tone. Her first and most widely read book is "The Chronicles of the Schönberg-Cotta Family" (1863), published anonymously; and all that have followed have appeared as the works of "The Authoress of the Chronicles of the Schönberg-Cotta Family." They include: "Diary of Mrs. Kitty Trevelyán" (1864); "The Cripple of Antioch" (1864); "Winifred Bertram" (1865); "The Draytons and the Davenants" (1866); "Against the Stream" (1873); "Joan the Maid: Deliverer of England and France" (1879); "Three Martyrs of the Nineteenth Century" (1885); and "By Thy Glorious Resurrection and Ascension" (1888). She died in Hampstead, England, March 28, 1896.

Runeberg, Johan Ludvig (rö'nuh-berg), a Swedish poet; born in Jakobsstad, Finland, Feb. 5, 1804. Though his whole life was spent in his native country, he wrote in Swedish. He wrote "Ensign Stal's Tales" (1848-1860), a collection of ballads on the war between Sweden and Russia; the idyls "Hanna" (1836), and "Christmas Eve" (1841); "The Elk-Hunter" (1832), and "Nadeschda" (1841), two tales in verse; and "The Kings at Salamis" (1863), a tragedy in antique form. He died in Borga, Finland, May 6, 1877.

Runes. In the Scandinavian lands, Sweden, Denmark, and Norway, thousands of inscriptions have been found written in the ancient alphabet of the heathen Northmen. Similar records are scattered sparsely and sporadically over the regions which were overrun or settled by the Baltic tribes between the 2d century and the 10th. A few are found in Kent, England, which was conquered by the Jutes, others in Cumberland, Dumfriesshire, Orkney, and the Isle of Man, which were occupied by the Norwegians, and in Yorkshire, which was settled by the Angles. One or two have been found in the valley of the Danube, which was the earliest halting place of the Goths in their migration S.; and there is reason to believe that a similar alphabet was used by the Visigoths and Burgundians in Spain and France, while it is noteworthy that there is no trace of this writing having been used in Germany or by the Saxons and Franks.

The writing is called Runic, the individual letters are called runestaves, or less

Runes

correctly runes, and the runic alphabet is called the futhorc, from the first six letters *f, u, th, o, r, c*. The old Norse word *run* originally meant something "secret" or magical. The oldest extant runic records may date from the 1st century A. D., the latest from the 15th or 16th, the greater number being older than the 11th century, when after the conversion of the Scandinavians the futhorc was superseded by the Latin alphabet. The form, number, and value of the runic letters changed considerably during the many centuries they were in use, the runes of different periods and countries exhibiting considerable differences. They may, however, be arranged in three main divisions: (1) the Gothic or old Scandinavian runes, which are chiefly found in inscriptions earlier than the 6th century; (2) the Anglian runes, used in Northumbria from the 7th to the 9th century; (3) the later Scandinavian runes, used in Sweden and Norway in the 7th and following centuries. These futhorcs are shown in the table. The oldest is the Gothic futhorc of 24 runes, divided into three families, each of eight runes. This is used in about 200 inscriptions, several of which can be approximately dated from the 3d century to the 5th, while others, from the more archaic forms of the runes, must belong to an earlier period. The oldest to which a date can be assigned is on a golden torque from a temple of the heathen Goths in Wallachia, which must be earlier than the conversion of the Goths in the 3d century. In the Anglian futhorc, which was derived from the Gothic, many new runes were obtained by differentiation, and the phonetic values underwent considerable changes. The Anglian runes are from 25 to 40 in number. The later Scandinavian futhorc, in which the greater number of runic inscriptions were written, consists of a definite alphabet of 16 runes.

The origin of the runic writing has been a matter of prolonged controversy. The runes were formerly supposed to have originated out of the Phœnician or the Latin letters, but it is now generally agreed that they must have been derived about the 6th century B. C., from an early form of the Greek alphabet which was employed by the Milesian traders and colonists of Olbia and other towns on the N. shores of the Black Sea. These traders, as we known from Herodotus, penetrated to the N. by the trade route of the Dnieper, as far probably as the territory occupied by the Goths on the head waters of the Vistula. This conjecture is confirmed by the fact that Greek coins struck in the 5th century B. C. have been found in the region of the Baltic. The oldest runic inscriptions being retrograde, the Goths must have obtained the art of writing from the Greeks at a time when

Runes

Greek was still written in the retrograde direction from right to left, which gives us a date earlier than the 5th century, but after the new letters *omega* and *chi* had been evolved, and while H retained the value both of *h*, which it has in the Latin alphabet, and of *ē*, which it has in the Greek, and also before *koppa*, which became Q in Latin, fell into disuse among the Greeks. From these and similar data it appears that the runic writing must have been obtained from the Greeks after the

ƿ	ᚋ	ᚑ	ᚖ	ᚗ	᚛	ᚦ	ᚨ	ᚧ
f	u	th	o	r	k	g (palat.)	w	
ᚷ	ᚢ	ᚣ	ᚤ	ᚥ	ᚦ	ᚧ	ᚨ	ᚩ
h	n	i	j	ch	p	eo	s	t
ᚱ	ᚲ	ᚳ	ᚴ	ᚵ	ᚶ	ᚷ	ᚸ	ᚹ
m	l	ng	æ	d	g (gutt.)	a	æ	y

English Runes.

ƿ	ᚋ	ᚑ	ᚖ	ᚗ	᚛	ᚦ	ᚨ	ᚧ
f, v	u, o	th, dh	q (o)	r	k, g	h	n	
ᚢ	ᚣ	ᚤ	ᚥ	ᚦ	ᚧ	ᚨ	ᚩ	ᚪ
i, e	a	s	t, d	p, b	l	m	r final	

Northern Runes.

ᚠ	ᚡ	ᚢ	ᚣ	ᚤ	ᚥ	ᚦ	ᚧ	ᚨ
a	b	d	e	f, v	g	h, s	i, j	k
ᚠ	ᚡ	ᚢ	ᚣ	ᚤ	ᚥ	ᚦ	ᚧ	ᚨ
o	p	r	s	t	th, dh	u, w	y	z

Northern Runes, from the "codex runicus."

ƿ	ᚋ	ᚑ	ᚖ	ᚗ	᚛	ᚦ	ᚨ	ᚧ
f	u	th	a	r	k	g	w	h
ᚢ	ᚣ	ᚤ	ᚥ	ᚦ	ᚧ	ᚨ	ᚩ	ᚪ
e	p	z	s	t	b	q	m	l

German Runes.

RUNIC ALPHABETS.

7th and earlier than the 5th century B. C. That the runic alphabet was developed from the Greek is proved among other things by the facts that it contains a symbol for *ō* which was developed from *omega*, a letter peculiar to the Greeks, and that it contains a symbol for *ng*, which proves to be a ligature of two *gammas*, Greek being the only language in which *gg* has the phonetic value of *ng*. The value of the runes must have changed to some extent after the symbols were obtained from the Greeks, owing to the sound changes tabulated in Grimm's law not having been completed at the time when the runic writing was obtained. Thus, according to Grimm's law, a Greek *th* answers to a Gothic *d*, and a Greek *ch* to a Gothic *g*, and we find, as we should expect, that the *d* rune was derived from *theta*, and the *g* rune from *chi*. The forms of the

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runes were considerably modified by the fact that they were cut with a knife on wooden slabs; consequently horizontal strokes, which would follow the grain of the wood, are necessarily avoided, and all the strokes are either vertical or slanting.

There are several interesting runic inscriptions in England, among which may be mentioned that on the Ruthwell cross in Dumfriesshire, and that on the Bewcastle cross in Cumberland. Several crosses in the Isle of Man are carved with the old Irish interlaced ornaments, and are in the form of the old Irish cross. As they have also runic inscriptions, this style of Irish ornament has wrongly acquired the name of runic knot work, and the Irish form of cross is often called the runic cross. These names originated at a time when archaeological knowledge was less advanced than it is now, and should be rejected. See ALPHABET.

Runjeet Singh, called the "LION OF THE PUNJAB," founder of the Sikh kingdom; born in Gugaranwalla, India, Nov. 2, 1780. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of 17, however, Runjeet rebelled against his mother's authority, assumed the reins himself, and began a career of ambition. The Shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjeet soon subdued the small Sikh states to the N. of the Sutlej. The chiefs to the S. of that river invoked the protection of the British, who made an arrangement with Runjeet in 1809, both accepting the Sutlej as the S. boundary of his dominions. He now organized his army after the European model with the help of French and English officers, and steadily extended his power, assuming the title of rajah in 1812. In 1813 he took Attock, and in the same year assisted Shah Shuja, then a refugee from Afghanistan, in return for the famous Koh-i-noor diamond. In 1818 he captured Multan; in 1819 he annexed Kashmir, and in 1823 the Peshawur valley. He was now ruler of the entire Punjab, and in 1819 had already assumed the title of Maharajah, or king of kings. In 1836 he suffered a heavy defeat from the Afghans, but until his death he retained his power over his 20,000,000 subjects. He died in Lahore, June 27, 1839.

Runkle, Bertha, an American author; born in Berkeley Heights, N. J.; received a private school education; became a critic and editor. She published "The Helmet of Navarre" (1901).

Runnimeade, a long stretch of green meadow, lying along the right bank of the Thames, 1 mile above Staines and 36 miles by river W. S. W. of London. Here, or on Charta Island, a little way off the shore

Rupert of Bavaria

MAGNA CHARTA (*q. v.*) was signed by King John, June 19, 1215. In the document the king states that it was signed "by our hands in the meadow which is called Runnimeade."

Runyon, Theodore, an American diplomatist; born in Somerville, N. J., Oct. 25, 1822; was graduated at Yale University in 1842; and admitted to the bar in Newark, N. J., in 1846. In 1853 he became city attorney of Newark, and in 1856 city councillor. At the outbreak of the Civil War he took command of the 1st Brigade of New Jersey Volunteers, and on April 27, 1861, started for Washington, D. C. On May 6 he reached the National capital, then in a state of great excitement because of an expected invasion by the Confederates with 3,000 men. He promptly took possession of exposed parts of the city and fortified its approaches, especially those at the Long Bridge. When the National army met its first defeat at Bull Run, and was fleeing toward Washington with the Confederates in close pursuit, he closed all approaches, planted cannon, and prevented both the panic-stricken National troops and the Confederates from entering the city. For thus saving the National capital he received the personal thanks of President Lincoln and his cabinet. Soon afterward he resigned from the army and resumed the practice of law. In 1863 he was elected mayor of Newark, N. J.; in 1873 became chancellor of New Jersey; in 1893 United States minister to Germany, and in September following was raised to the rank of ambassador. He died in Berlin, Germany, Jan. 27, 1896.

Rupree, a silver coin in use in the British dominions in India, with corresponding ones of much inferior workmanship and variable value in the native states. In 1896 it was worth in United States money, 23.3c. Also a gold coin of India, worth in United States money, 32.4c.

Rupert of Bavaria, Prince, an English military officer; born in Prague, Bohemia, Dec. 17, 1619. He was the third son of Frederick V., elector palatine and King of Bohemia, by Elizabeth, daughter of James I. of England. After some military experience on the Continent he went to England to assist his uncle, Charles I., and in 1642 was made general of the horse. He distinguished himself at Edgehill and Chalgrove, captured Birmingham and Lichfield in 1642, and Bristol in 1643, and displayed his courage at Marston Moor and Naseby in 1645, though his impetuosity and imprudence contributed to the disastrous results of these engagements. His feeble defense of Bristol against Fairfax involved him in temporary disgrace with Charles; but in 1648 he was made admiral of the English royalist fleet. He carried on a

Rupertsland

predatory naval war against Parliament, in European waters, till Blake forced him to escape to the West Indies, where he preyed on English and Spanish merchantmen somewhat after the manner of a buccaneer. In 1653 he joined Charles II. at Versailles. After the Restoration he was appointed lord-high-admiral and served with Monk against the Dutch. He became governor of Windsor Castle, privy-councilor, etc. Many of his later years were devoted to scientific study, and he was formerly credited with the invention of mezzotint engraving, which he improved and introduced into England. He invented PRINCE RUPERT'S DROPS (*q. v.*). As one of the founders and the first governor of the Hudson Bay Company his name was given to RUPERTSLAND (*q. v.*). He died in London, Nov. 29, 1682, and was buried in Westminster Abbey.

Rupertsland, an extensive but indeterminate region in the interior of Canada, named in honor of Prince Rupert, and transferred to the Hudson Bay Company, of which that prince was one of the founders, by Charles II. in 1670. This region is now included in Manitoba and the Western Territories, but its name still gives the title to the Bishop of Rupertsland, who resides at Winnipeg.

Rupia, a somewhat severe form of skin disease. It is characterized by flattish, distinct *bullæ* or blebs, containing a serous, purulent, or sanious fluid, which becomes changed into thick scabs. Several varieties of this disease have been established by dermatologists. In its simplest form the blebs are not preceded by any inflammatory symptoms, are about an inch in diameter, and contain a fluid which is originally thin and transparent, but soon thickens, becomes purulent, and dries into brown ragged scabs which are elevated in the center. The scabs are easily separated, and leave ulcerated surfaces on which several successive scabs usually form before healing ensues. In a more severe form, known as *rupia prominens*, the scab projects so much in the center as to resemble a limpet shell in form.

Rupia is a chronic disease, and is usually limited to the limbs, the loins, and the nates. It is not contagious, and generally attacks persons debilitated by old age, intemperance, bad living, or previous diseases, especially smallpox, scarlatina, and syphilis. The general treatment consists mainly in the administration of tonics (*e. g.*, quinia), the mineral acids, ale, wine, animal food, etc. Some writers strongly recommend the tincture of serpentaria; and there is no doubt that certain cases which will not yield to tonics rapidly improve when treated with iodide of potassium. The local treatment consists in puncturing the blebs as soon as they arise, in remov-

Rush

ing the scabs by poulticing, and in applying a slightly stimulating application—such as a solution of nitrate of silver—to the subjacent ulcers. The disease is frequently tedious and obstinate, but the patient almost always ultimately recovers.

Rupture, the breaking or laceration of the walls or continuity of an organ, especially of a viscus. Also, the popular name for HERNIA (*q. v.*).

Rurik, the founder of the Russian monarchy; flourished in the 9th century; he is generally considered to have been a Varangian of Scandinavian origin, and to have led a successful invasion against the Slavs of Novgorod about 862. He was assisted by his brothers, to whose territories he afterward succeeded. He died in 879, and his family reigned in Russia till the death, in 1598, of Feodor, son of Ivan the Terrible, when it was succeeded by the house of Romanoff. Many Russian families still claim a direct descent from Rurik.

Rusa, a genus of *Cervidæ*, or a sub-genus of *Cervus*, with several species, from the East Indies. They are generally of large size, and have round antlers, with a snag projecting in front just above the base of each. There are several species, of which the best known is *R. aristotelis*, the sambur.

Rusby, Henry Hurd, an American botanist; born in Franklin, N. J., April 26, 1855; was connected with the Smithsonian Institution in 1880–1896; appointed Professor of Botany, Physiology, and Materia Medica in the New York College of Pharmacy in 1888; Professor of Materia Medica at Bellevue Hospital Medical College; Curator New York Botanical Gardens; revised botanical department of the "United States Pharmacopœia" in 1900–1901. He was a member of a large number of scientific societies and wrote "Essentials of Pharmacognosy" (1895); "Morphology and Histology of Plants" (1899); "Five Pamphlets on Flora of Bolivia" (1893–1901); "History of New York College of Pharmacy" (1895); etc.

Rusden, George William, a British historian; born in Surrey in 1819. He removed to New South Wales in 1834, and made elaborate researches on the history and languages of the Island Continent. He has published: "Moyarra: An Australian Legend" (1851); "Discovery, Survey, and Settlement of Port Philip" (1872); "Translations and Fragments" (1874); "History of New Zealand" (1883); and "History of Australia" (1883), a most careful and detailed work.

Rush (*Juncus*), a genus of plants of the natural order *Juncææ*, having a glume-like (not colored) perianth, smooth filaments, and a many-seeded, generally three-celled capsule. The species are numerous, mostly natives of wet or marshy places in the

Rush

colder parts of the world; some are found in tropical regions. Some are absolutely destitute of leaves, but have barren scapes (flower stems) resembling leaves; some have leafy stems, the leaves rounded or somewhat compressed, and usually jointed internally; some have plane or grooved leaves on the stems; some have very narrow leaves, all from the root. The name rush perhaps properly belongs to those species which have no proper leaves; the round stems of which, bearing or not bearing small lateral heads of flowers, are popularly known as rushes. The soft rush (*J. effusus*) is a native of Japan as well as of Great Britain, and is cultivated in Japan for making mats. The common rush (*J. conglomeratus*) and the soft rush are largely used for the bottoms of chairs and for mats, and in ruder times, when carpets were little known, they were much used for covering the floors of rooms; to this many allusions will be found in early English writers. The stems of the true rushes contain a large pith or soft central substance, which is sometimes used for wicks to small candles called rushlights. There are 20 or 22 British species of rush, some of which are very rare, some found only on the highest mountains, but some are among the most common of plants. They are often very troublesome weeds to the farmer. Thorough drainage is the best means of getting rid of them. Lime, dry ashes, road scrapings, etc., are also useful. Tufts of rushes in pasture are a sure sign of insufficient drainage. Many marshy and boggy places abound in some of the species having leafy stems and the leaves jointed internally, popularly called sprots or sprits, as *J. acutiflorus*, *J. lamprocarpus*, and *J. obtusiflorus*. They afford very little nourishment to cattle; but are useful for making coarse ropes for ricks, etc., which are stronger than those made of hay.

Rushlights or candles with rush wicks were anciently much in use, and Gilbert White tells us how, by carefully dipping the rush in grease with a little wax added, the poor man might enjoy five and a half hours of comfortable light for a farthing. Rushes, with a few sweet herbs, were used to strew the floors before carpets came into use, and, as they were seldom entirely renewed, the insanitary consequences may be imagined. The stage was also strewed with rushes in Shakespeare's time, as well as the churches with rushes or straw according to the season of the year—a custom still honored at the Hull Trinity House—and anciently rushes were scattered in the way where processions were to pass. To order fresh rushes was a sincere mark of honor to a guest. The strewing of the churches grew into a religious festival conducted with much pomp and circumstance.

Rush

This ceremonious rush-bearing lingered long in the N. counties of England, and has been occasionally revived in modern times, as at Grasmere in 1884, etc.

Rush, Benjamin, an American physician; born in Philadelphia, Dec. 24, 1745; he was graduated at Princeton in 1760; studied medicine in Philadelphia, Edinburgh, London, and Paris; and in 1769 was made Professor of Chemistry in the Philadelphia Medical College. Elected a member of the Continental Congress, he signed the Declaration of Independence (1776). In April, 1777, he was appointed surgeon-general, and in July physician-general, of the Continental army. His duties did not prevent him from writing a series of letters against the articles of confederation of 1776. In 1778 he resigned his post in the army because he could not prevent frauds on soldiers in the hospital stores, and returned to his professorship. He was a founder of the Philadelphia dispensary, the first in the United States, and of the College of Physicians, was active in the establishment of public schools, was a member of the state conventions which ratified the Federal Constitution and formed the State constitution. He next became Professor of the Theory and Practice of Medicine at Philadelphia, to which chair he added those of the Institutes and Practice of Medicine and Clinical Practice (1791); and of the Practice of Physic (1797); and during the epidemic of 1793 he was as successful as devoted in the treatment of yellow fever. In 1799 Rush was appointed treasurer of the United States Mint, which post he held till his death. He was called "the Sydenham of America" and his medical works brought him honors from several European sovereigns. He wrote "Medical Inquiries and Observations" (5 vols. 1789-1793); "Essays" (1798), and "Diseases of the Mind" (1821). He died in Philadelphia, April 19, 1813.

Rush, Richard, an American statesman; born in Philadelphia, Pa., Aug. 29, 1780; son of the preceding. He was graduated at Princeton College in 1797; studied law in Philadelphia; was appointed attorney-general of Pennsylvania in 1811, and was attorney-general of the United States from 1814 to 1817. In 1817 he was temporary Secretary of State under President Monroe, and was by him appointed minister to England, from whence he was recalled in 1825 by President Adams, who made him Secretary of the Treasury. In 1828 he was candidate for the vice-presidency on the same ticket with President Adams, who was nominated for reelection, and received the same number of electoral votes. In 1836 President Jackson appointed him commissioner to obtain the Smithsonian legacy, then in the English Court of Chancery, in which

he was successful, and returned in 1838 with the entire amount, \$515,169. In 1847 he was appointed minister to France. At the close of President Polk's term he asked to be recalled and spent the rest of his life in retirement. He died in Philadelphia, Pa., July 30, 1859. He left "Memoranda of a Residence at the Court of St. James" two volumes (1833-1845); "Washington in Domestic Life" (1857); "Occasional Productions, Political, Diplomatic, etc., while the Author resided as Envoy Extraordinary from the United States, at Paris," published by his sons (1860).

Rushforth, William Henry, an American inventor; born in Leeds, England, July 11, 1844; came to the United States in 1878 and was appointed engineer in a silk factory in Camden, N. J. He made many inventions, the most important being a fire-escape ladder, a series of automatic safety-car signals, and a feed-water heater, which received a silver medal and diploma at the Paris Exposition in 1887. He died in Rutherford, N. J., Aug. 21, 1892.

Rusicada. See PHILIPPEVILLE.

Rusk, Jeremiah McLain, an American agriculturist; born in Morgan co., O., June 17, 1830; removed to Wisconsin in 1858 and became a farmer. He entered the Union service during the Civil War, as major of a regiment he had raised, the 25th Wisconsin Volunteers; was promoted lieutenant-colonel in 1863; was brevetted colonel and Brigadier-General, 1865. From 1866 to 1870 he was bank-controller of Wisconsin, and represented his State from 1871 to 1877 in Congress. In 1882 he was elected governor of Wisconsin and served in that capacity till 1889. He was made secretary of the newly-created Department of Agriculture in 1889, and held this office till 1893. He died in Viroqua, Wis., Nov. 21, 1893.

Ruskin, John, an English author; born in London, Feb. 8, 1819. He studied at Christ Church, Oxford; gained the Newdigate prize in 1839, and graduated in 1842. In 1867 he was appointed Rede lecturer at Cambridge, and in 1870-1872, 1876-1878, 1883-1885, he was Slade Professor of Fine Arts at Oxford, where in 1871 he gave \$25,000 for the endowment of a university teacher of drawing. In "Modern Painters" he advocated a complete revolution in the received conventions of art and art criticism. Ruskin was the first art critic to place criticism upon a scientific basis. In 1851 he appeared as a defender of pre-Raphælitism. About 1860 he began to write as a political economist and social reformer; his chief works in this sphere being "Unto this Last" (1862); "Munera Pulveris" (1872); and "Fors Clavigera" (1871-1884), a periodical series of letters to the working men and laborers of Great Britain. In this connection he founded in 1871, "The Guild of

St. George"; founded a linen industry at Keswick, and revived, in Langdale, hand loom weaving. His chief works, apart from pamphlets and contributions to periodicals, are: "Modern Painters" (1843-1860); "Seven Lamps of Architecture"; "Poems" (1850); "King of the Golden River" (1851), a fairy legend; "Notes on the Construction of Sheepfolds" (1851), a contribution to ecclesiastical controversy; "The Stones of Venice" (1851-1853); "Giotto and his Works at Padua" (1854); "Lectures on Architecture and Painting" (1854); "Notes on the Royal Academy" (1855-1859 and 1875); the letterpress accompanying "Turner's Harbors of England" (1856); "Notes on the Turner Gallery at Marlborough House" (1857); "Catalogue of Turner's Sketches at the National Gallery" (1857); "Elements of Drawing" (1857); "Political Economy of Art" (1857), better known as "A Joy Forever"; "Elements of Perspective" (1859); "Sesame and Lilies" (1865); "Study of Architecture in our Schools" (1865); "Ethics of the Dust" (1866); "Crown of Wild Olive" (1866); "Queen of the Air" (1869); "Lectures on Art" (1870); "Aratra Pentelici" (1872); "The Eagle's Nest" (1872); "Ariadne Florentina" (1873); "Love's Meinie" (1873); "Val d'Arno" (1874); "Proserpina" (1875); "Deucalion" (1875); "Mornings in Florence" (1875); "Frondes Agrestes" (1875-1876), "readings" from "Modern Painters"; "St. Mark's Rest" (1877); "Elements of English Prosody" (1880); "Fiction, Fair and Foul, in the 19th Century" (1880-1881); "Our Fathers have Told Us" (1881); "Lectures on the Art of England" (1883); "On the Pleasures of England" (1884); "Sir Herbert Edwards" (1885); "Hortus Inclusus" (1887), a selection of letters; and "Præterita," an autobiography (1885-1889). After 1885 he lived at Brantwood, on Coniston Lake, where he died Jan. 20, 1900.

Russell, Addison Peale, an American journalist and essayist; born in Wilmington, O., Sept 8, 1826. He wrote: "Half-Tints" (1867); "Library Notes" (1875); "Thomas Corwin: A Sketch" (1881); "Characteristics" (1884); "A Club of One" (1887); "In a Club Corner"; and "Sub Cælum" (1893).

Russell, Sir Charles Arthur, a British jurist; born in Killowen, Ireland, Nov. 10, 1832; was educated at Trinity College, Dublin; admitted to the English bar in 1859; made Queen's counsel in 1872; treasurer, 1892; member of Parliament from 1880-1894; and attorney-general in 1886 (when he was knighted) and in 1892-1894. He defended the prisoner in the Maybrick murder case in 1889, and was counsel for the defendant (Parnell) before the Parnell Commission. He was counsel for Great

Russell

Britain during the Bering Sea Arbitration Tribunal in 1893; became Lord Chief Justice of England; and was created 1st Baron Russell of Killowen in 1894. In 1896 he visited the United States as guest of the American bar association; and in 1899 was British arbitrator in the Venezuelan Boundary Tribunal. He died Aug. 10, 1900.

Russell, Irwin, an American verse-writer; born at Port Gibson, Miss., June 3, 1853. He was among the first to put the negro character to literary account. His dialect and other verse was collected after his death and published as "Poems" (1888). He died in New Orleans, La., Dec. 23, 1879.

Russell, John, Earl Russell, K. G., an English statesman, third son of the 6th Duke of Bedford; born in London, Aug. 18, 1792. Educated at Edinburgh University, he entered Parliament in 1813 before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, of which through life he was the champion. Though temporarily unseated in 1826, owing to his advocacy of Catholic Emancipation, he carried a motion in 1828 against the Test Acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and introduced the first Reform Bill to the House of Commons. He was home secretary from 1835-1839, when he became colonial secretary. From 1841 till 1845 he led the opposition against Peel, with whom, however, he was in sympathy on the Corn Law question; and when Peel resigned in 1846 Russell formed a ministry and retained power till February, 1852. He reentered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna conference, but resigned office in July of the same year. In 1859 he became foreign secretary, the Trent affair with the United States occurring while he was in office. In 1861 he was raised to the peerage, and in 1865 succeeded Lord Palmerston in the leadership of the Liberal party; but when his new reform bill was rejected in 1866 he went out of office. He was the author of numerous books and pamphlets, including lives of Thomas Moore, Lord William Russell, and Charles Fox, and "Recollections and Suggestions" (1813-1873), published in 1875. He died May 28, 1878.

Russell, John Scott, a British naval architect; born near Glasgow, Scotland, in 1808. He became a science-lecturer in Edinburgh, and in 1832-1833 temporarily filled the chair of Natural Philosophy at Edinburgh University. Next year he began his important researches into the nature of waves, which led to his discovery of the wave of translation, on which he founded the wave-line system of naval construction introduced

Russell

into practice in 1835. He was manager of a large shipbuilding yard on the Clyde for several years, and in 1844 established a yard of his own on the Thames. He was one of the earliest advocates of iron-clad men-of-war, and was joint designer of the "Warrior," the first English seagoing armored frigate; but the most important vessel he designed and constructed was the "Great Eastern." One of his chief engineering works was the vast dome of the Vienna Exhibition of 1873, which has a clear span of 360 feet. He was the author of "The Modern System of Naval Architecture" (London, 1864-1865; 3 vols. folio), and other writings. He died in Ventnor, June 10, 1882.

Russell, William, Lord Russell, an English statesman, third son of the 5th Earl of Bedford; born Sept. 29, 1639. He entered Parliament immediately after the Restoration, and in 1669 married Rachel, Lady Vaughan, afterward known for her "Letters." He was a prominent leader of the Whigs, animated by a bitter distrust of the Roman Catholics and a strong love of political liberty. In 1679 he was a member of the new privy council appointed by Charles II. to ingratiate himself with the Whigs. Resigning in 1680, he became conspicuous in the efforts to exclude the king's brother, the Roman Catholic Duke of York, from the succession to the throne, but retired from public life when the Exclusion Bill was rejected. When the Ryehouse Plot was discovered in 1683, Russell was arrested on a charge of high treason, and though nothing was proved against him the law was stretched to secure his conviction. He was sentenced to death, and was beheaded in London, July 21, 1683. An act was passed in 1689 reversing his attainder.

Russell, William Clark, an English novelist; born (of English parentage) in New York city, Feb. 24, 1844. He spent much of his early life at sea, and afterward settled at Ramsgate, England. He published a great number of sea stories and novels, among which are: "The Wreck of the Grosvenor" (1878); "A Sailor's Sweetheart" (1880); "My Watch Below" (1883); "A William Clark Russell. Sea Queen" (1883); "Jack's Courtship" (1884); "A Strange Voyage" (1885); "The Frozen



Pirate” (1887); “*The Death Ship*” (1888); “*Marooned*” (1889); “*The Romance of Jenny Harlowe*” (1889); and “*The Good Ship Mohock*” (1895); “*Rose Island*” (1896); “*List Ye Landsmen*,” “*The Two Captains*,” and “*Nelson*” (1897); “*The Romance of a Midshipman*” (1898); “*The Ship’s Adventure*” (1899).

Russell, William Eustis, an American lawyer; born in Cambridge, Mass., Jan. 6, 1857; was graduated at Harvard University in 1877, and was admitted to the bar in 1880; was mayor of his native city in 1885–1887, and governor of Massachusetts in 1890–1892. He then resumed the practice of law, and became a member of the Board of Indian Commissioners in November, 1894. He was found dead in his fishing tent at Little Pabos, Quebec, Canada, on the morning of July 16, 1896.

Russell, Sir William Howard, an English journalist; born in Lilywater near Dublin, March 28, 1820. He was special correspondent of the London “*Times*” in the Danish war in Schleswig-Holstein (1850); in the Crimea (1854–1855); in India during the Sepoy Mutiny (1857–1859); in the Italian campaign (1859); and in 1861 was sent to the United States, but returned after the first Bull Run. He was correspondent in the Austro-Prussian War (1866); in the Franco-German War of 1870; in the war in South Africa (1879–1880); in the Egyptian War (1883–1884). He published: “*Extraordinary Men*” (1853); “*The Crimean War*” (1855–1856); “*My Diary in India*”; “*My Diary during the Last Great War*” (1873); “*The Prince of Wales’s Tour*” (1877); “*Hesperothen*” (1882); and others. In 1895 he was knighted in recognition of his services to journalism. He died in London, Feb. 10, 1907.

Russia, one of the great empires of the world, second in extent to only the British Empire. It occupies the greater half of Europe, the whole of Northern Asia, and a large part of Central Asia. With the exception of the outlying islands, it represents one great land mass covering about one-sixth of the land surface of the globe, or one twenty-third of its entire superficies. It is bounded on the N. by the Arctic Ocean; on the W. by Norway, Sweden, the Gulf of Bothnia and the Baltic Sea, Prussia, Austria, and Rumania; on the S. by the Black Sea, Turkey, Persia, Afghanistan, the Chinese empire, and Korea; and on the E. by the Pacific Ocean. The total length of the frontier line of the Russian empire by land is 2,800 miles in Europe and 9,500 miles in Asia; by sea, 11,100 miles in Europe and 19,600 miles in Asia. Its principal territorial divisions are European Russia, including Poland and the grand duchy

of Finland; the Caucasus, including Transcaucasia; Central Asia, including Turkestan; and Siberia. Northern Manchuria, through which the Trans-Siberian railroad passes, is largely under Russian influence, although in reality a part of the Chinese empire. The total area of the Russian empire exceeds 8,660,000 square miles, and the total population in 1908 was estimated at about 150,000,000.

Topography and Hydrography.—Notwithstanding the great diversity of its special physical features, the vast mass of the empire presents a remarkable uniformity. Excepting Southern Crimea and Caucasia, it consists almost wholly of wide-stretching plains, broken only by the Ural mountains (*q. v.*), representing the conventional boundary between Europe and Asia. These mountains have never seriously interfered with the eastward expansion and colonization of the Russian people. S. of the Urals the European and Asiatic plains of Russia merge into one vast whole.

The plain is traversed by numerous great rivers. In European Russia they radiate from the watershed of the Valdai hills (*q. v.*) in the W. The most important of them are: the Pechora, which empties into the Arctic; the Mazen, Dvina, and Onega, which flow into the White Sea; the Neva, Narova, Düna, Niemen, and Vistula, into the Baltic; the Dniester, Bug, and Dnieper, into the Black Sea; the Don and Kuban, into the Sea of Azov; and the Volga and Ural rivers, into the Caspian Sea. The Torneå river flows on the Swedish frontier; the Niemen (Memel) and Vistula enter Prussian territory before emptying into the Baltic; and the Pruth and one of the mouths of the Danube divide Russia from Rumania. The greatest river of European Russia, as well as of Europe, is the Volga, which rises in the Valdai hills, has a length of some 2,400 miles, nearly all of it navigable, and by means of its branches and numerous canals connects the river systems of the Caspian, Black, Baltic, and White seas. Its importance in the internal economy of Russia is incalculable.

Siberia has four great river systems, those of the Ob or Obi, the Yenisei, the Lena, and the Amur. All of these rivers have their sources in the highlands of the S., and their length exceeds 2,500 miles. The first three empty into the Arctic Ocean, while the Amur empties into the Sea of Okhotsk, opposite the island of Sakhalin. It is the most important of the four rivers for the purposes of commerce and navigation. For a large part of its course it divides the territory of Russia from that of China in Northern Manchuria. The most important rivers of Turkestan are the Amu-Darya and Syr-Darya, both emptying into the inland depression of the sea or lake of Aral.

In the N. W. of European Russia, particularly in Finland, are thousands of lakes, the principal ones being the Onega, Ladoga (which is the largest in Europe, having an area of 6,998 square miles), Ilmen, and Peipus. Some of these lakes are extremely important for the internal navigation of the empire. In Asiatic Russia there are, besides the Caspian Sea, the great lakes of Aral and Balkhash, in Central Asia, and Baikal, in Siberia.

Climate, Soil, Flora and Fauna.—The climate of Russia is, generally speaking, very cold during the long winter and very hot during the short summer. Exposed as the great plains are to the icy blasts of the Arctic Ocean, they are much colder than the countries of Western Europe in corresponding latitudes. Even in the S., on the shores of the Black Sea, the ground is deeply covered with snow for nearly three months, and the rivers freeze in winter everywhere throughout the empire. On the whole, considering the vast extent of the country, the climate is remarkably uniform, and atmospheric disturbances are propagated without obstruction over the entire surface. The mean annual temperature becomes lower as we proceed from W. to E. The rainfall over the greater part of the country is comparatively small. It is greatest in the N. W. of European Russia, and decreases toward the S. E., being least around the shores of the Caspian. It is abundant on the Pacific coast, though not always adequate to the needs of agriculture in Siberia as a whole.

The great plain of European and Asiatic Russia extends, with the partial interruption of the Ural mountains, for some distance beyond the Lena river in Eastern Siberia, where a number of broadly parallel mountain ranges, with a general N. and S. direction, give to this section of Siberia a mountainous character. The N. part of this section, known as Yakutsk, is the coldest part of the empire, and save for a few weeks in summer, a land of utter desolation. The soil is permanently frozen to a depth of hundreds of feet, the temperature falls in winter to 70° below zero, and the precipitation both of snow and rain is light. For the rest, Russia may be conveniently divided into five climatic and vegetable zones. In the extreme N., between the Arctic circle and the Arctic Ocean, is the tundra region, a marshy, treeless land, covered in winter with ice and in summer with mosses, lichens, and low shrubs, though in some favored places there is quite a luxuriant growth of grasses. S. of the tundras is the forest zone, comprising the birch, larch, silver fir, and other hardy trees in the N.; pines, firs, and other conifers in the center; and great deciduous forests of oak, maple, ash, etc., in the S. These forests are among the most extensive on the

globe and contain enormous sources of wealth both in timber and in fur-bearing animals. Agriculture has advanced into the S. portion of this zone, the cleared lands being sown with rye, flax, and hemp. S. of the forest region, in the central portion of European Russia, is the most fertile part of the empire, the famous zone of black earth, which supplies a great part of Western Europe with wheat. S. of this is the region of steppes, divided by the river Don into two parts of totally unequal character. The western half, N. of the Black Sea, is grassy prairie, in portions of which the soil consists of fertile black earth. But farther E., in the lower basin of the Volga and extending as far as the Ural river, the steppes are partly of the desert type. They occupy a depression, which once formed a portion of the Caspian Sea, and the surface of which is now some 80 feet below the Mediterranean. This depression extends E. into Russian Turkestan, a region of scanty rainfall, disappearing waters, and progressive desiccation, presenting mainly the appearance of barren steppe and desert during the greater part of the year, but covered with a rich and beautiful vegetation of grasses and flowers during a period of about two months. Irrigation works have been applied to reclaim the soil, and Turkestan has become a cotton and silk producing region. Together with Bessarabia, the Crimea, and the Caucasus, it constitutes the most southern of the Russian zones of climate and vegetation. There maize is grown, and the vine and olive thrive. To the E., in the S. portion of Western Siberia, succeeding the belt of low marshy tundra, comes the great forest region of the mountainous country, rich in pine, spruce, oak, maple, beech, and poplar. In many parts of Southern Siberia, the long summer days permit a rapid and luxuriant growth of grasses, and a large area is devoted to the cultivation of hay and cereals. The S. rim of Siberia has an alpine character, which it shares with the Caucasus.

The animal life of Russia is extremely rich and varied, extending through all gradations from the reindeer of the N. to the camel of the salt steppe in the S., where Europe and Asia merge. Seals are found in the waters of the extreme N., and the arctic fox, polar bear, and reindeer in the zone of tundras. The forest region abounds in foxes, wolves, bears, wild boars, and numerous smaller fur-bearing animals. The waters of the N. W. coast are rich in cod and salmon; near the mouths of the Don, Volga, and Ural, and in the Caspian Sea, are the most important fisheries of Russia, yielding herring, sheat-fish, sturgeon, etc. The Pacific coast has attained to considerable importance in respect of its fishing interests.

Ethnography.—The fundamental geo-

graphical unity of the great Russian plain has made possible its consolidation into one empire; but it was originally occupied by a host of peoples, tribes, and hordes belonging to different races, speaking distinct languages, and professing various religions. Many of these aboriginal peoples have disappeared from the face of the earth, having been for the most part swallowed up in the eastward tide of Russian migration, colonization, and conquest; but a very large number of them still survive, speaking their native languages, in many cases professing primitive forms of religion, and ranging in culture through various gradations down to the lowest level of the barbarous, roving horde. The Russians—the most numerous branch of the Slav division of the Aryan family—constitute the dominant nationality in the empire, contributing about two-thirds of its population, and they in turn are subdivided into Great Russians, White Russians, and Little Russians. The first are the most numerous (over 55,000,000), and occupy the N. W., central, and E. portions of European Russia, as well as large tracts of Siberia. The White Russians, whose language is practically the same as that of the Great Russians, occupy the W. provinces that were formerly included in Lithuania (Kovno, Vilna, Grodno, Minsk, etc.), and number about 6,000,000. The Little Russians, numbering about 22,000,000, speak a dialect that differs considerably from that of the Great Russians, and are of a more mobile temperament. Originally centered about Kiev, they have spread E. and S. E., penetrating in large masses as far as Northern Caucasia. The Great Russians have a large admixture of Finnish blood, the White Russians have mixed with the Lithuanians, and the Little Russians have absorbed numerous Turkish and Tatar tribes. Next to the Russians, the most numerous Slav people in Russia are the Poles, centered mostly in the Polish or Vistula provinces, but found in large numbers also in the provinces of Little Russia. Their number is variously estimated at from 8,000,000 to 10,000,000. Lithuanians are numerous in the W. provinces of Russia proper, in some of the Polish provinces, and in the Baltic provinces, having been subjugated in the latter by the Teutonic Knights. Their total number is over 3,000,000. Among the minor nationalities may be especially mentioned: the Jews, over 5,000,000, restricted by law (with certain specified exceptions) to the “pale of settlement” in the W. and S. W., where they are further confined to the towns and cities; the Swedes of Finland, about 300,000; the Rumanians of Bessarabia and other South Russian provinces, over 1,100,000; and the numerous nationalities of the mountains and valleys of the Caucasus, Georgians, Mingrelians, Lezgians, etc., as well as the Armenians,

Kurds, and Persians, who are found mostly in Transcaucasia. The bulk of the non-Aryan population is composed of Finns, Tatars, and Mongols. The Finns are most numerous in the grand duchy of Finland, where they have formed a distinct nationality and evolved a high civilization; in the N. provinces, from the shores of the Baltic (where they are known under the names of Karelians, Chuds, and Esths) to the Ural mountains (Permians, Syrianes), and across the Urals as far as the Yenisei river (Voguls, Ostiaks, Samoyedes); and in the basin of the Volga and its tributaries (Mordvins, Cheremisses, Votiaks). Their position in the scale of civilization becomes lower to the E. and N., the Voguls and Samoyedes being hunters and nomads. Outside of Finland the Finns, from the very beginning of Russian history, have been slowly but surely absorbed by the Russian nationality. Ethnically akin to the Finns (as well as to the Hungarians and Turks) are the various Turko-Tatar tribes, which in the basin of the Volga and in the Crimea are known mainly as Tatars and are quite Russian in speech, custom, and occupation, though they are Mohammedan in religion. In the Aral-Caspian region they are known as the pastoral and nomad Bashkirs and Kirghizes, or the more civilized Turkomans; and on the banks of the Lena, in Eastern Siberia, they are mainly nomad hunters, like the Yakuts. In the government of Astrakhan, in the S. E. of European Russia, are over 100,000 pastoral and nomadic Kalmucks, Mongolian by race, who extend as far E. as the outskirts of the Altai mountains. Siberia also contains numerous other peoples of Mongol and Manchurian race (Tunguses, Buriats, Golds, etc.), besides some Chinese, Koreans, and Japanese. In the extreme N. of Asiatic Russia are the hyperboreans: Ainos in the island of Sakhalin, Kamchadales in the peninsula of Kamchatka, Yukaghirs, who live N. of the Yakuts, Giliaks, Eskimos, Chukches, Koriaks—driven by stronger tribes to inhospitable climes, wandering hordes of hunters and fishers, lowest in the scale of civilization.

An element of the present population of Russia deserving particular mention is that of the Germans, numbering about 1,800,000. They constitute a large element of the city population in the Polish provinces; they are the landowners, merchants, manufacturers, and professional classes in the Baltic provinces, where they came originally as conquerors, and are to this day the ruling class; and they have formed numerous agricultural colonies in South Russia and in certain of the Volga provinces, such as Saratov and Samara. They are very numerous represented in the official classes, both in the army and in the civil service, even to the imperial family. In many cases

they have become thoroughly Russianized, so that their extraction is indicated only by their surnames.

Area and Population.—The rapidity of the growth of the empire in population (the acquisitions by conquest being included) may be seen from the following: In 1722 the population was estimated at 14,000,000; in 1762, at 19,000,000; in 1812, at 41,000,000; in 1859, at 74,000,000; and in 1904, at 144,000,000. The following table gives the areas and population of the great territorial divisions as shown by the final results of the census of 1897. The proportion of the two sexes in the empire (exclusive of Finland) is nearly equal, namely, 99.9 women for 100 men, but it differs considerably for the different sections owing to the internal migrations of the male population.

Divisions	Area, Square Miles, Including Internal Waters	Population, 1897	Density per Square Mile, Excluding Internal Waters
European Russia..	1,902,202	93,442,864	50.6
Poland	49,159	9,402,253	193
Finland (estimated)	144,255	2,483,249	20
Caucasia.....	180,843	9,289,364	52
The Steppes.....	755,793	2,465,735	3.5
Turkestan	409,414	4,898,496	12
Transcaspia	383,618	382,487	1
Dependencies	101,400	2,050,000	20
Siberia	4,820,557	5,730,709	1.2
Total.....	8,747,241	130,145,157	15
Total, Jan. 1, 1909		160,095,200	

The composition of the population (exclusive of Finland, Khiva, and Bokhara) according to native language was as follows: Great Russian, 55,667,469; Little Russian, 22,380,551; White Russian, 5,885,547; Polish, 7,931,307; Lithuanian, etc., 3,094,469; German, 1,790,489; Rumanian, 1,121,669; Armenian, 1,173,096; Jewish, 5,063,156; Kartvelian (Georgian, Mingrelian, etc.), 1,352,535; other Caucasian languages, 1,091,782; other Indo-European languages, 1,286,919; Finnish languages, 3,502,147; Turko-Tatar languages, 13,601,251; other languages, 697,634; total, 125,640,021.

The composition of the population according to religion is given in the following statistics. It should, however, be borne in mind that the number of dissenters from the Greek Orthodox Church (the established church of Russia) is considerably larger than the official census figures would indicate. It is probably not less than 10,000,000, and may possibly reach as high as 13,000,000. Greek Orthodox churchmen, 87,123,604; dissenters, 2,204,596; Armenian Gregorians, 1,179,241; Armenian Catholics, 38,840; Roman Catholics, 11,467,994; Lutherans, 3,572,653; Reformed, 85,400; Baptists, 38,139; Mennonites, 66,564; Anglicans, 4,183; other Christians, 3,592; Jews,

5,215,805; Karaims, 12,894; Mohammedans, 13,906,972; Buddhists, 433,863; other non-Christians, 285,321; total, 125,640,021.

The division of the population according to social status is still sufficiently marked in Russia to deserve especial notice. Peter the Great introduced the nobility of service, composed of the higher state functionaries, upon whom he bestowed the same privileges as were enjoyed by the old hereditary nobility (*boyars*). Nowadays the nobles possess important privileges in regard to the service of the state, both civil and military, in regard to higher education, and especially in regard to local administration and justice; they are also entitled to mortgage loans from the state bank at a low rate of interest. Special privileges are also enjoyed by officials, the educated and professional class, "honorary citizens," etc. The peasants, who constitute four-fifths of the entire population and were not emancipated from a condition of servitude till the middle of the nineteenth century, have not yet attained to full citizenship, being subject to many special restrictions and disabilities, and under the tutelage of the local magnates. The nationalities most numerous represented among the foreigners were: 158,103 Germans, 121,599 Austro-Hungarians, 120,720 Turks, 73,920 Persians, and 47,571 Chinese.

According to the census of 1897 over 70 per cent. of the population of the empire (exclusive of Finland) were dependent for their living upon agriculture; nearly 4 per cent. on pastoral and kindred occupations, such as bee-culture, etc.; nearly 10 per cent. on industrial occupations; nearly 3.5 per cent. on commercial occupations; over 4.6 per cent. on domestic service; nearly 0.7 per cent. on wagon transportation. In Poland, which is the most industrial section of the empire, nearly 16 per cent. of the population are dependent on manufacturing. The great bulk of the population being agricultural, they naturally dwell in villages. In 1897 the number of towns and villages in the empire (exclusive of Finland) was 728,157. The cities with more than 100,000 inhabitants numbered 19. Three-fourths of these cities are near the frontiers of the empire. The sanitary conditions of the large cities are of the very worst, and in many of them the rate of mortality surpasses the birth rate.

The average annual increase of population in the empire (exclusive of Finland) is about 2,000,000. During the years 1890-95 the number of births per 1,000 inhabitants was 45.8, the number of deaths 33.3, giving a rate of increase of 12.5 per 1,000 inhabitants.

The movement of population into and from the empire is very considerable, but the total number of those leaving has recently exceeded the total number of those

entering. The destination of the large majority of Russian emigrants, composed mainly of Jews, Poles, and Finns, is the United States. There is also a considerable migration within the empire to the more thinly settled sections thereof, particularly into Siberia. The number of immigrants into Siberia is stated to have been less than 30,000 annually between 1880 and 1890, but amounts now to about 400,000 or 500,000 annually.

Religion.—While nearly all Russians belong to the Greek Orthodox Church, or to the numerous sects that have sprung from it, a number of White Russians are Uniates, that is, they admit the supremacy of the Pope of Rome while adhering to the special beliefs and rites of the Greek Church. The Poles and most of the Lithuanians are Roman Catholics. Lutheran Protestantism prevails in the Baltic provinces and in Finland. The Armenians belong to the Armenian or Gregorian Church, a variety of the Eastern or Greek Church. Mohammedanism is widely prevalent in Eastern and Southern Russia, among the Tatars, Bashkirs, and Kirghizes, as well as in Caucasia and Central Asia. The Finnish populations of Eastern Russia have mostly been converted to the Greek Church; but they, like the Kirghizes, retain a good many Shamanistic practices. Though converted to the Greek Church, the Voguls are in reality fetichists, or idol worshipers, while the mostly unconverted Samoyedes are pure fetichists, who feed their idols with raw flesh. The Kalmucks are Buddhists of the Lamaist variety, as are also most of the Buriats, in the region of Lake Baikal, Siberia, though some of the latter have been converted to Christianity. The Ostiaks of Western Siberia are Shamanists.

All religions may be freely professed in the empire, but the adherents of some of them, notably Jews, Roman Catholics, and seceders from the state church, have at all times been discriminated against with more or less of harshness. The Greek Church—officially the Orthodox-Catholic Faith—is favored in its propaganda as against all other religions, and children of mixed marriages must be brought up in its fold, while intermarriages between Christians and Jews are entirely prohibited. The emperor is the head of the state church in all matters of government and appointment to offices, but practically the government of the church is vested in the Holy Synod, composed of high ecclesiastical dignitaries, at the head of which stands the procurator, as representative of the emperor. The annual contribution of the state to the expenditure of the Holy Synod is considerable, having amounted to 29,126,155 rubles (\$15,000,690) in 1906, besides which it also enjoys large revenues of its own, as well as those of the churches and monasteries. The af-

fairs of the Roman Catholic Church and of the Lutheran Church are administered, respectively, by a collegium and a consistory at St. Petersburg.

The numerous sects of dissidents from the established church may be roughly divided into three classes: the so-called Old-Believers (*starovyertsy*), who regard themselves as more conservative than the established church; the rationalistic sects, bearing strong resemblances to the Protestant sects of Western Europe and America; and the extremely unstable sects called "spiritualist Christians," that profess to model their lives in accordance with the primitive Christian Church. (See DUCHOBORTZI; RASKOLNIKS.) From their first appearance the dissenters have been treated with harsh cruelty by the government. But spoliation, enforced exile to inhospitable regions, and even death itself did not put a stop to the increase of their number; for nonconformity was an inevitable protest against the intolerable oppression, and the extravagant forms it has so frequently assumed were due to the prevailing ignorance and superstition fostered by state and church. By a decree promulgated in 1906, the government finally accorded to dissenters full religious freedom.

The established church is divided into 66 bishoprics, which are under 3 metropolitans, 14 archbishops, and 50 bishops. All of these highest officers of the church belong to the monastic clergy. The number of churches was 49,082 in 1900, with 46,014 priests and deacons, and 58,529 cantors and other assistants. The number of monasteries was 828 (including 325 nunneries), with 8,578 monks and 8,090 aspirants, and 10,082 nuns and 31,533 aspirants. Some of the monasteries are reputed to be in possession of enormous wealth.

Education.—The intellectual condition of the Russian people is deplorable. Except in Finland, which is not really an integral part of the empire, even rudimentary instruction is neglected. The efforts of the provincial and district assemblies (*zemstvos*), as well as all private initiative, to raise the intellectual level of the masses, have been hampered in every conceivable way by the central government. The result is that total illiteracy is extremely widespread. According to the returns of the last census (1897), the number of those who can neither read nor write varies, in the country districts, from 89.2 per cent. of the population in the province of Kars, to 44.9 per cent. in the province of St. Petersburg; and in the towns, from 63.6 per cent. in the province of Penza, to 46.0 per cent. in the province of Vologda, and 37.2 per cent. in the province of St. Petersburg. The percentage of illiteracy varies with the different religious confessions as follows: Greek Orthodox, 81.0; Old-Believers, 79.8; Ar-

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menian-Gregorian, 86.7; Roman Catholic, 67.9; Protestants, 29.6; Jews, 61.0; Mohammedans, 92.8.

Neither the elementary nor the middle schools are under a unified administration. Besides the ministry of public instruction, there is the Holy Synod, which has under its charge the parish schools, taught partly by the priests, but to a much greater extent by their more ignorant assistants. The ministries of finance, agriculture, justice, and war maintain special schools for the teaching of the particular subjects with which they are concerned, most of the commercial and trade schools of the middle grade being under the administration of the ministry of finance. The army regiments maintain a large number of classes in which the soldiers are taught, at least, reading, and the Jews and Mohammedans have schools of their own in which theological subjects are mainly taught. Excluding these irregular schools, the number of elementary schools in the empire, with their teachers and pupils (over one-fourth of the latter being female), was as follows in 1903:

Administered by	Schools	Teachers	Pupils
Ministry of Public Instruction.....	45,235	109,631	3,360,167
Holy Synod	43,969	95,878	1,782,883
Other ministries and various foundations...	1,738	3,885	201,697
Total.....	90,942	209,394	5,344,747

There are about 440,000 pupils in over 1,000 secondary schools, including *gymnasias* (classical schools), *real-gymnasias* (modern language schools), normal schools and teachers' seminaries, theological seminaries, commercial, technical, special, and trade schools. For higher education there are nine universities at St. Petersburg, Moscow, Kiev, Kharkov, Odessa, Dorpat or Yuriev, Warsaw, Kazan, and Tomsk. Most of the universities consist of four faculties: law, medicine, historical-philological, and physical-mathematical. The total number of students in these universities was 19,394 in 1904. Finland has a university of its own at Helsingfors. Other schools of higher learning are: six for medicine, three for law, four for Greek Orthodox theology, one for Roman Catholic and one for Armenian theology, thirteen for technology, two for mining, four for engineering, four for agriculture, one for forestry, five for philology, one for archæology, six military schools, etc. Russian industry suffers from a great deficiency of technical schools, both secondary and higher, which cannot at present supply the needs of the country.

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The funds for maintaining the schools are derived from the contributions of the various ministries, the Holy Synod, provincial authorities, municipalities, village communes, fees, and private donations. The contributions of the central government (ministries and Holy Synod) for the year 1906 were estimated at \$39,496,000, amounting to about 3 per cent. of the total estimated expenditure for that year.

There are many learned societies (of which the Geographical Society is favorably known for its tireless activity), museums, and libraries. But the government puts obstacles in the way of opening libraries for the people, and the books for the popular libraries must go through a triple censorship. The number of newspapers and periodicals is very small, about 1,000; about four-fifths of them are in Russian, one-tenth in Polish, one-twentieth in German, and the remainder in Lettish, Esthonian, Georgian, Armenian, Hebrew, English, and Finnish. Some ten of them appear in two, three, and four languages.

Government.—The system of Russian government is in a condition of unstable equilibrium. The imperial decree of Oct. 30, 1905, granted to the people the inviolability of the person, freedom of conscience, press, meeting, and association, and also provided that no law shall come into effect without the approval of the national assembly or imperial *Duma*, to be composed of the elected of the people, which, moreover, is to control the legality of the acts of such authorities as are appointed by the emperor. But the first Duma was unable to work in accord with the imperial authorities and was dissolved, various decrees were issued whittling down the powers of the Duma and aiming to reduce it to a mere machine of consent to the proposed expenditures and loans, ministerial accountability to the elected of the people was declared never to have been contemplated, and a second Duma was summoned based on a more restricted franchise. This was dissolved in its turn, the franchise was further modified so as to give the preponderance to the great landowners, and a third Duma was elected in 1907. The head of the government is the emperor, or czar, irresponsible, absolute, uniting in himself all the powers of government, legislative, executive, and judicial. His abbreviated title is Emperor and Autocrat of All the Russias, Czar of Poland, and Grand Duke of Finland. He must be of the Greek Orthodox Church. The administration is intrusted to great boards, or councils, and the various ministries. The senate, established by Peter the Great in 1711, has deliberative, executive, and judicial functions. Its members are persons of high rank or office. It promulgates all laws, exercises a general supervision over officials and judges, and is the highest court of jus-

tice for the empire. It is divided into a number of sections or departments, each dealing with a special class of cases and presided over by a lawyer of eminence, who represents the emperor and whose signature is necessary to give force to its decisions. When the senate or several of its sections meet together, the minister of justice presides. The Holy Synod, established by Peter the Great in 1721, superintends the religious, and in large part also the educational, affairs of the empire. It is composed of the three metropolitans of St. Petersburg, Moscow, and Kiev, the archbishop of Georgia, and several bishops sitting in turn. The various ministries are not united into a cabinet under the presidency of a premier, and their policies frequently clash. The ministries are: imperial household and domains, foreign affairs, war, navy, interior, public instruction, finance, justice, land organization and agriculture, ways and communications, commerce and industry, department of general control, procurator-general of the Holy Synod, minister and state secretary for Finland. The emperor has several private cabinets dealing, respectively, with charities, the administration of the institutions for the instruction of girls established by the Empress Maria, the reception of petitions to the emperor, and a special cabinet in three sections dealing with economy, mines and manufactures, and legislation.

The empire is divided into 78 provinces or "governments," 19 territories, and one section (North Sakhalin). The provinces and territories are subdivided into districts. A number of provinces are united into general-governments. The provinces are under civil governors, the territories, the Sakhalin section, and the town of Kronstadt (the naval fortress of St. Petersburg) are under military governors, and the general-governments are under governors-general with both civil and military authority. The governors of provinces and the governors-general of Siberia are assisted by appointive councils, and each province has a council of control depending directly on the department of general control at St. Petersburg. The cities of St. Petersburg, Moscow, Odessa, Kertch, Nikolaiev, and Rostov-on-Don are under separate urban governors. The delegates to the district assemblies are composed of three classes, nobles, householders in the towns, and peasants, while the provincial assembly is composed of delegates from the district assemblies. The marshal of the nobility of the district or province presides, *ex officio*, over the district or provincial assembly. The law of 1890 increased the authority of the officials over the zemstvos and the power of the nobles in the zemstvos, and abrogated the right of the peasants to elect their own delegates, who are now virtually appointed by the provincial

governors. The law of 1870 conferred similar institutions upon the towns and cities of provinces. All house-owners are divided into three classes, each of which represents an equal amount of property and elects an equal number of delegates to the municipal assembly (*duma*). In 1892 the powers of the municipal assemblies were also curtailed, so that they are now almost entirely under the thumb of the provincial governors. In 1894 municipal institutions of still more restricted scope were introduced into a number of towns in Siberia and Caucasia.

Besides these general institutions of local self-government, there are also special institutions of self-government for the peasantry. These deal with matters that concern the peasants exclusively, and are thus strict class institutions. At the base of this system is the village community (*mir*), composed of all those who hold shares of the common land. The members of the village community hold meetings as occasion requires, and elect from among themselves the village elder and tax-collector, whose powers extend over all the inhabitants of the village, even those who are not members of the commune. A number of village communities generally go to the making up of a canton, which bears different names in different parts of the country (*volost* among Russians, *gmina* among Poles, *stanitsa* among Cossacks, *ulus* among aborigines). There are in the whole country 18,012 cantons. The delegates to the cantonal assembly are elected by the village community in the proportion of one delegate to ten houses. The canton, like the village, is an exclusively peasant institution, in which noblemen, ecclesiastics, artisans, and merchants have no place; but while the *mir* existed even in the ages of serfdom, the *volost* is of recent introduction. The latter also constitutes a tribunal in minor civil matters among the peasants, and its decisions are made not in accordance with the general civil law of the empire, but in conformity to local custom. Each province also has a special board for peasant affairs. In Poland the assembly of the canton also includes the landholding nobility, but each landholder has only one vote. The law of 1889 placed the peasants' assemblies under the direct control of "rural chiefs," who are appointed by the provincial governors from the nobility, and who have the power of naming the judges of the peasants' cantonal courts, of inflicting corporal punishment on the peasants without any trial, and of oppressing the peasants in various other ways. This institution of the *zemski nachalnik* constitutes one of the bitterest grievances of the Russian peasants and has done much to alienate them from the autocracy.

In 1815 Alexander I. granted a constitution and separate government to Poland.

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The former was abolished after the Polish rebellion of 1830, and the last vestiges of Polish administrative independence were wiped out in 1868, as a result of the insurrection of 1861. The administration of Poland was completely incorporated with that of Russia, Russian became the official language, and the use of the Polish language was prohibited even for such purposes as signboards and railway announcements. The institution of the zemstvos was never extended to Poland.

The provinces of Esthonia, Livonia, and Courland formerly had their own institutions of local self-government. The German-speaking nobles, the descendants of the conquerors of the soil, who are the great land-owners, were the real power, and exercised judicial and police rights. These privileges were taken away by the laws of 1888 and 1889. Russian was made the official language, as well the teaching language in the University of Dorpat, where German had been the teaching language, and the name of the town of Dorpat was changed to Yuriev, its original Russian name. In pursuance of the policy of Russification, the Russian government sought to gain the good will of the Finnish and Lettish peasantry without seriously hurting the interests of the nobility, and committees for peasants' affairs were introduced, with the same powers as in the Russian provinces.

The grand duchy of Finland was ceded by Sweden to Russia in 1809, and the old constitution was preserved by special grants of Alexander I. and his successors until 1899. This constitution provided for a national legislature consisting of delegates from the four estates, nobles, clergy, burghers, and peasants, which deliberated on all laws, while the grand duke, the emperor, had the right of veto. The laws proposed to the diet had first to be elaborated by the senate, and they were laid before the emperor by the secretary of state for Finland, who resides at St. Petersburg. The Finnish senate is composed of citizens of Finland appointed by the crown, and is presided over by the governor-general at Helsingfors. It is the supreme administrative power, and consists of two departments, justice and administration. Finland has its own money system and forms an independent customs district, but it has no existence in relation to foreign powers. From 1899 to 1903 a series of decrees was issued from St. Petersburg, aiming at the abolition of Finnish autonomy and at the incorporation of Finland in the general scheme of Russian absolutism. But the passive resistance of the Finns, aided by the high tide of the revolutionary movement in Russia, led to the abrogation of these decrees on Nov. 4, 1905. The legislative, judicial, and military independence of Finland was restored, and the senate was reinstated in its old position.

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The diet met on Dec. 20, 1905, adopted fundamental laws providing for liberty of the press, meeting, and association, and passed a law for the election of a new diet on the basis of universal suffrage, including the suffrage for women, who are also eligible as deputies. The new diet was elected in the early part of 1907.

Justice and Laws.—Capital punishment was abolished as early as the middle of the eighteenth century, and is legal only for attempts on the life of the emperor. The use of torture in criminal investigations was formally prohibited in 1801, though it is known to have been resorted to as late as 1850. Corporal punishment, which often ended fatally, continued legally until the judicial reforms of Alexander II., but was reintroduced for the peasants under Alexander III., and is applied also to others, particularly political offenders, in contravention of all law. Throughout the reigns of Nicholas I. and of his predecessors, military offenders and insubordinate convicts were compelled to run the gauntlet, which frequently resulted in permanent mutilation or immediate death. The law of 1864 aimed at the total reformation of the judicial system in European Russia, by separating the judicial from the executive power, introducing trial by jury and publicity of judicial procedure, and establishing the equality of all classes before the law. Under this law two separate judicial systems were introduced, the courts of justices of the peace and the regular tribunals, the senate being the supreme court of revision. But it was soon found that the reform could not maintain itself against the official arbitrariness of Russian autocracy, and within a few years many of the ameliorative features were eliminated. The old, inefficient, and corrupt tribunals were, however, gradually replaced by the reformed ones in the various governments and provinces, though trial by jury was never introduced in them. The old tribunals were thus abolished throughout the empire. According to official figures in February, 1908, 165,588 persons were confined in Russian prisons, of whom 13,000 were political prisoners.

The Russian passport system prohibits a Russian subject from leaving the country, or even traveling from one place to another within the country, without obtaining the permission of the police; and administrative exile enables the authorities to rid themselves of any undesirable person—reformer or political offender—by transporting him or her to remote regions, without even the pretense of a trial, but simply by administrative order.

Finance.—The revenue of the empire is divided into ordinary and extraordinary. The latter is derived mainly from new loans, while the chief sources of the ordinary revenue are all sorts of direct and indirect

taxes, customs duties, the whiskey monopoly, and railways. The expenditure is likewise divided into ordinary and extraordinary. The latter comprises mainly the construction of new railways, while the chief items of the ordinary expenditure are the state debt, war and marine, railways, and the administration of the various departments and provinces. The total revenue increased from about 1,409,000,000 rubles (1 ruble = 51.5 cents) in 1895 to 2,404,000,000 rubles in 1904, while the total expenditure increased from 1,496,000,000 rubles in 1895 to 2,738,000,000 rubles in 1904. The total estimated revenue and expenditure for 1906 was nearly 2,511,000,000 rubles. The largest items of revenue were estimated as follows: Customs duties, 213,430,000 rubles; sale of spirits, 568,436,000; and state railways, 474,895,000. The largest items of expenditure were as follows: Public debt, 334,730,000 rubles; army, 374,856,000; navy, 104,079,000; ways and communications, 477,717,000. The total expenditures of all the local government bodies, according to the latest available figures, were about one-tenth those of the central government. The national debt amounted in 1907 to 8,375,645,948 rubles, having grown from 539,585,621 rubles in 1852, mainly as a result of foreign wars.

Army.—Universal compulsory military service has been the law of the empire since 1874. Out of about 1,000,000 men who attain the age of twenty-one, about 300,000 are annually drafted for service, the remainder being inscribed in the militia. The period of service with the colors is from three to four years, and the period of liability to service extends to the forty-third year. The peace strength of the army is estimated at about 1,100,000 men (about 950,000 combatants), divided into 33 army corps, and composed of about 710,000 infantry, 130,000 cavalry, 153,000 artillery, 42,000 engineers, and 41,000 in various services. The war strength of the army is about 4,500,000 on paper, but this represents the strength to be drawn upon, rather than the strength that can be actually mobilized; for the latter purpose there are not enough munitions of war, railways, and trained officers. For military purposes the empire is divided into thirteen military districts. Large bodies of troops are usually massed on the German and Austrian frontier, and smaller bodies are concentrated in the Caucasus, Turkestan, and Eastern Siberia (Amur district). The Cossacks (*q. v.*) constitute a peculiar feature of the Russian military system. There were in 1907 eleven separate Cossack colonies or armies. The peace effective of all the Cossack armies is about 65,000; the war effective, 182,000. Finland has an independent little army of some 5,000 men, service in it being obligatory for a period of three years.

Navy.—Owing to the widely separated seas that wash its shores, Russia maintains four distinct fleets in the Baltic, Black, and Caspian seas, and on the coast of Siberia. Each has its own organization. The principal base of the largest, the Baltic, is Cronstadt (*q. v.*). Libau (*q. v.*) is next in importance. The chief base of the Black Sea fleet is Sevastopol, or Sebastopol (*q. v.*); of the Caspian flotilla, Baku (*q. v.*); and of the Pacific fleet, Vladivostok (*q. v.*). Owing to the highly specialized nature of the service, the navy has, perhaps, suffered more from the inefficiency and corruption of the administration than any other branch of the service. During the war with Japan, the best part of the fleet was sunk or captured by the Japanese, so that for a time the Russian navy became almost a negligible quantity. In 1906 its total effective strength was given as 362 ships of all descriptions with 40,800 officers and men. But most of the battleships and cruisers were antiquated, and owing to the internal condition of the empire no large programme of naval construction could be ventured upon.

Agriculture.—The soil of Russia is distributed among three great classes of proprietors: the state and the imperial family, private owners, and peasants. The following tables show the distribution of the land in European Russia proper and in Poland in 1902:

1. EUROPEAN RUSSIA PROPER

	Acres	Per cent. of Total Area	Per cent. Unfit for Cultivation
State and imperial family...	403,609,583	36.7	31.7
Peasants	385,422,924	35.0	9.6
Private owners, towns, etc..	311,373,460	28.3	14.4
Total....	1,100,405,967	100.0	19.1

2. POLAND

	Acres	Per cent. of Total Area	Per cent. Unfit for Cultivation
State and imperial family...	1,807,050	6.0	5.1
Peasants	12,233,732	40.9	5.4
Private owners, towns, etc..	15,890,294	53.1	7.1
Total.....	29,931,076	100.0	6.1

In Poland and over a large part of Western Russia the peasants mostly hold their lands as private possessions, although among the White Russians and Little Russians certain restrictions are still more or less in force in regard to the sale, inheritance, and subdivision of the individual allotment. But over the greater portion of Central and

Eastern Russia, that is to say, among the Great Russians, the peasants hold their land collectively. The real owner of the land cultivated by the inhabitants of the village is the village community as a whole, which allots to each household a certain amount of land only for a certain time. This institution has been retained by the Great Russian settlers in all their migrations. Other Russian, and even foreign, settlers on new lands, have also adopted it with more or less of completeness. The system of cultivation is known as the three-field system. The first field is reserved for winter wheat, or rye, which constitutes the principal food of the rural population; the second field for summer wheat, oats, and buckwheat; the third field lies fallow and is used in summer as pasture for cattle. The crops follow each other in triennial rotation. The field that is sown with summer grain the first year is sown with winter grain the next year, and lies fallow the third year. The land of the commune falls into three classes: the land on which the village is built, the arable land, and the meadow land. The first is occupied by the houses and adjacent gardens or orchards, which are the hereditary property of the households. The arable land is divided into three parts, in conformity with the three-field system, and each field is divided into a number of long narrow strips to correspond generally with the number of adult male workers in the commune. The third class of land consists of the meadow or hay-field, which as a rule is subdivided annually. All assignments of land are made by the drawing of lots. The common, used for grazing, is under no restriction, and every householder may send to it all his cattle. Likewise the woodland, if abundant; but when it is scarce, every trunk is counted and valued, and the whole subdivided and distributed according to the number of land lots. The time and mode of redistribution are determined by the full meeting of the commune, consisting of all the heads of households. Each has an equal voice, irrespective of the number of lots assigned to him. In the case of absence or death of the male head of the household, the female head of the household takes his place. In 1893 a law was promulgated prohibiting redistribution more than once in twelve years and making it necessary to obtain first the sanction of the newly instituted rural chief (*zemski nachalnik*). Taxes are assigned in proportion to the number of lots. Until 1903 the commune had a joint responsibility for the taxes of all its members. The commune, which has existed from time immemorial, has in recent years been affected by various modifying forces that appear to threaten its ultimate extinction.

The present condition of the great mass of the Russian peasantry is deplorable. The

prime causes of this condition are to be sought in misgovernment, lack of education, and the grinding taxation, which frequently exceeds the total annual income of the peasant from his land allotment and must be covered from his earnings elsewhere. Another important cause of the general poverty is the lack of land. With the growth of population and the stagnation in methods of cultivation, the lot of the peasant has become ever harder, and he has fallen a prey to the usurer or to the large landowner. The central government has come to recognize that something must be done to alleviate these conditions. It has frequently remitted arrears of taxation, which could not be collected anyhow; it remitted in 1906 the still outstanding payment of the redemption money for the lands which the peasants received at the time of emancipation; and it established in 1882 a Peasants' Land Bank, which advances money to peasant purchasers of land, on the security of the land, at the rate of $7\frac{1}{2}$ per cent. per annum, including the sinking fund, so that the debt to the bank would become extinguished at the end of $34\frac{1}{2}$ years.

The chief agricultural product of the country is rye, which is raised principally in the northern and central provinces, where it occupies one-half or more of the entire agricultural area. In the more southern provinces wheat is the leading product, taking up about the same proportion of the agricultural area. In the Baltic and Polish provinces both wheat and rye are grown. Barley prevails in the northern sections, taking up almost 54 per cent. of the cultivated area in the province of Archangel. It is an important crop also in the southern provinces, but in the central portions of the country it is insignificant. Indian corn is raised almost exclusively in the southwest and in Caucasia, taking up one-fourth of the cultivated area in the province of Bessarabia. Potatoes are raised chiefly in the Baltic and Polish provinces; it is an important crop also in the central provinces, but becomes insignificant in the extreme eastern provinces. Buckwheat is raised chiefly in the section marking the transition from the forest region to that of the black soil (Chernigov, Kursk, Penza, Kazan, Ufa, Moghilev, and Volhynia), millet in the black soil region, and spelt in the provinces of Kazan and Ufa. Hemp and flax are cultivated extensively in the northwestern and central provinces; tobacco mainly in the provinces of Chernigov, Poltava, Samara, Voronezh, Taurida, Tambov, Bessarabia, Kuban, and Kutais; wine in Bessarabia, Taurida, and Transcaucasia; tea in Transcaucasia; cotton in Turkestan (chiefly Ferghana), Transcaucasia, Khiva, and Bokhara; and rice and silk in Turkestan and the Caucasus. The sugar beet is grown in immense quantities in various parts of the

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empire, and furnishes enormous quantities of sugar for export, besides supplying the needs of the country.

In 1904 the area under crops was as follows, in acres:

	Cereals	Potatoes	Meadows	Total
European Russia	188,884,000	7,653,000	69,692,000	266,229,000
Poland ..	11,039,000	2,270,000	2,406,000	15,715,000
Caucasia.	12,964,000	187,000	5,525,000	18,676,000
Siberia ¹ .	9,200,000	181,000	11,301,000	20,682,000
Central Asia ² ..	2,643,000	27,000	3,480,000	6,150,000
Total for 72 provinces ..	224,730,000	10,318,000	92,404,000	327,452,000

¹Provinces of Tobolsk, Tomsk, Yeniseisk, and Irkutsk.

²Provinces of Akmolinsk, Semipalatinsk, Turgai, and Semirychinsk.

The leading crops of these 72 provinces, in 1905, were in round numbers as follows: Wheat, 17,020,000 tons; rye, 18,411,000 tons; oats, 13,363,000 tons; barley, 7,425,000 tons; other cereals, 4,700,000 tons; potatoes, 28,134,000 tons; hay, 47,849,000 tons. Flax occupied in 1904 3,887,000 acres, which yielded 538,996 tons of fiber and 512,125 tons of seed. In the same year hemp covered 2,001,000 acres, which yielded 352,220 tons of fiber and 393,999 tons of seed. The area under sugar beet in 1905-06 was 1,392,000 acres. The wealth of live stock in 1904 is shown in the following table:

	Horses	Cattle	Sheep and Goats	Pigs
European Russia (exclusive of Finland)...	24,051,000	33,208,000	47,496,000	12,197,000
Caucasus....	1,234,000	2,873,000	7,706,000	737,000
Russia in Asia	4,254,000	4,483,000	9,192,000	734,000
Total.. ...	29,539,000	40,564,000	64,394,000	13,668,000

Forests.—The forests are very unequally distributed. In European Russia they cover from 60 to 75 per cent. of the total area in the provinces of the extreme N. and of the Ural mountains, while in the provinces of the S. and S. E. there is a deficiency of woodland, and reforestation has begun. The area under forests in Asiatic Russia has not been ascertained with any degree of accuracy, but has been roughly estimated at 307,500,000 acres for Western Siberia and 40,500,000 acres for Eastern Siberia (exclusive of the Amur region). In European Russia it is approximately 550,000,000 acres, or 39 per cent. of the total area, distributed as follows: Russia proper, 474,000,000 acres; Finland, 50,500,000 acres; Poland, 6,700,000 acres; Caucasasia, 18,700,000 acres.

Russia

The ownership of 64 per cent. of the forests of European Russia is vested in the state, 23 per cent. is the property of private persons, 9 per cent. is the property of the peasants, 3 per cent. belongs to the crown, and the remaining 1 per cent. is distributed among municipalities, companies, etc. The state forests are distributed over the empire as follows: European Russia, 285,986,000 acres; Caucasus, 12,826,000; Asiatic Russia (exclusive of Amur region), 360,519,000; Amur region, 288,742,000; total, 948,074,000 acres. The net revenues of the state from this immense forest region are comparatively insignificant, owing to the lack of efficient and scientific management, but they increased from 8,283,000 rubles in 1886 to 26,693,000 rubles in 1896 and 49,310,000 rubles in 1904. The establishment of forestry schools is gradually resulting in better management. The forests are valuable not only for their wealth of timber, but also for their fur animals, particularly in the provinces of the extreme N. and in Siberia.

Fishing.—Salted fish constitutes a leading article of diet among the Russians, particularly among the poorer classes. Fishing is carried on mainly on the Murman coast of the Kola peninsula, in the Arctic Ocean, where seals are caught; in the White and Baltic seas; in the lakes of the Baltic basin (Onega, Ladoga, Ilmen, etc.); in the Azov and Black seas; and above all in the Caspian Sea, at the mouths of the Volga and Ural rivers. The introduction of cold storage has made it possible to pack the fish in a fresh state and to transport them in this condition to the heart of the country. The value of the annual product of the fisheries is estimated at \$35,000,000.

Mining and Metals.—In its mineral wealth Russia is one of the most richly endowed countries, but its development has not yet progressed very far, owing to inadequate means of communication and a lack of fuel. Gold, of which 37,502 kilogrammes (1 kilogramme = 2.205 lbs.) was produced in 1904, is obtained principally in Siberia, Central Asia, and the Ural mountains. Platinum, of which Russia is the greatest producer (4,933 kilogrammes in 1904), comes from the European side of the Urals. Silver (1,032 kilogrammes in 1904) and lead (326 tons) come from Siberia and the Caucasus; zinc (10,445 tons), from Poland; copper (8,480 tons), from the Urals and Caucasus; and manganese, of which about 500,000 tons was produced in 1905, comes from the province of Kutais, in Transcaucasia, this being the world's chief source of supply for the mineral. The only regions where coal and iron are found near each other are the basin of the Donetz, in South Russia, the most important of the Russian coal and iron fields; Poland, and the country around Moscow; but separately they

are found also in other parts of the country. The coal production amounted in 1904 to 18,620,000 tons (having increased from 298,500 tons in 1860), yet enormous quantities had to be imported. The production of pig iron, of which South Russia supplies nearly two-thirds, the Urals one-fourth, and Poland one-ninth, amounted in 1905 to 2,712,000 tons; that of iron and steel was over 2,302,000 tons in 1905. The petroleum oil field of Baku, in Transcaucasia, is one of the richest in the world, the production of 1905 amounting to over 5,261,000 tons. This was only about two-thirds of the normal production. Rich beds of rock salt exist in the Donetz basin and in the provinces of Astrakhan and Perm, and salt is also obtained from the lakes of the south-eastern steppe, as well as from brine. The total salt production amounted in 1904 to nearly 1,842,000 tons. Valuable stones, such as malachite, onyx, topaz, emeralds, and diamonds, are found in the Urals. Porcelain clays occur in the Crimea. Marble is quarried in Finland and the Crimea. In the country as a whole, however, building stone is deficient; the houses and huts are mostly of wood, and destructive conflagrations are unusually common.

Manufactures.—Much of the manufacturing industry of Russia is carried on by the peasants in their homes or in village shops. They turn out textile goods, as well as leather, metal, and wooden articles, and their work is highly skilled, owing to the training of generations and the minute division of labor. Often whole villages are engaged in turning out one particular kind of article or group of articles. On the other hand, the modern manufacturing industry, carried on by masses of workers with the aid of machinery under the factory system, is of comparatively recent introduction. As long as serfdom prevailed every condition necessary for the establishment of the modern industrial system was wanting. There were neither free laborers, who could migrate freely from place to place according to the fluctuating requirements of changing industrial conditions; nor was there a class in possession of freely disposable capital; nor was there an internal market, for most of the needs of the peasants, as well as of their owners, were supplied by the industry of the peasants themselves; nor was there in the country the special technical knowledge and the general intelligence required for the successful carrying out of modern industrial operations. Notwithstanding all the efforts of the government to create an artificial soil for the factory industry by means of high tariffs and subsidies, it could not take root as long as such obstacles remained. The reforms of Alexander II., inadequate though they were for the progress of the country, and above all the emancipation of the peasantry, first cre-

ated the natural conditions for the establishment of manufacturing industries on a large scale. Even now, however, Russian manufactures cannot compete with the products of Western Europe in the world market, and they are enabled to maintain themselves in the domestic market only by means of a high tariff wall. About one-fifth of the capital invested in Russian industries is derived from foreign countries, France being the foremost Russian creditor. A large number of the laborers work in the factories in winter and return to the villages for agricultural work in the summer months, but the number of permanent factory laborers is constantly increasing.

In 1897 the total number of persons engaged in manufacturing occupations was 2,098,262. In 1902 the industrial population was distributed among the chief branches of industry as follows: Articles of food, 303,213; textiles, 708,186; leather, 56,179; wood, 79,664; chemicals, 60,108; paper and cardboard, 78,395; metals (exclusive of mining), 252,215; glass and earthenware, 150,809; various, 22,004; giving a total of 1,710,773. In 1903 the number of industrial establishments subject to the factory inspection law was, in European Russia, 13,796, with 1,467,842 laborers; in Poland, 2,649, with 224,045 laborers; and in part of the Caucasus, 268 establishments, with 19,868 laborers; total, 16,713 establishments, with 1,711,755 laborers. This does not include the mining population, which numbers over 500,000.

The chief seats of industry in Russia proper are the Moscow district, in the center, and Ivanovo with its surrounding territory, in the S.; while Lodz is known as the Manchester of Poland. Other important manufacturing centers are St. Petersburg, Tver, Rostov, Nikolaiev, Warsaw, Tiflis, etc. During the decade 1890-1900, the number of spindles and looms employed in the cotton industry nearly doubled, and the consumption of cotton more than doubled. In 1890 there were 3,457,116 spindles and 87,190 looms, while the consumption of cotton amounted to 128,269 tons. In 1900 the number of spindles increased to 6,554,597; that of looms to 154,577; and the consumption of cotton to 262,110 tons. The production of sugar amounted in 1906 to over 895,000 tons, which is about the average production; and that of alcohol (a government monopoly) was 96,788,000 gallons, a good deal above the average for the preceding five years. The rapid development of the railway system has led to an immense increase of the timber industry, which in 1887 employed 15,000 workmen in 567 sawmills, turning out a product valued at about \$8,500,000, and in 1897 employed 42,000 workmen in 1,266 mills, turning out a product valued at about \$35,000,000. The number of joint stock companies engaged in

financial, manufacturing, and transportation enterprises was 1,455 in 1903, with a total capital of over \$1,000,000,000. The investment of French capital in Russian enterprises was estimated in 1906 at over \$158,000,000.

Commerce.—Owing to its situation between Europe and Asia, and to its industrial condition, Russia occupies the position of an agricultural country toward the West, and that of an industrial country toward the East. From Western Europe it imports manufactured articles, exporting to it grain, flax, hemp, and other raw materials; while from China, Persia, and Central Asia it buys tea, cotton, and silk, selling to them its manufactured products. Over nine-tenths of its foreign commerce is carried on across its European frontiers, and less than one-tenth across the Asiatic. In 1905 the imports of merchandise across the European and Black Sea frontiers amounted to \$254,018,000; from Finland, which has a distinct customs system, \$15,347,000; and across the Asiatic frontier, \$38,415,000; total imports, \$307,780,000. In the same year the exports of merchandise across the European and Black Sea frontiers amounted to \$491,516,000; to Finland, \$19,725,000; and across the Asiatic frontier, \$27,965,000; total exports, \$593,206,000. This enormous excess of exports over imports has continued since 1902, the excess in former years having been much smaller. It is mainly due to the enormous indebtedness of Russia to Western countries, the excess of exports going to pay the interest on the national debt as well as on the commercial and industrial investments of foreign capital. About one-half the value of the imports consists of raw materials and half-manufactured articles, and about one-fourth of the imports consists of manufactures. Of the exports, articles of food constitute about seven-tenths of the total value, and raw materials and partly manufactured articles about three-tenths. The grains alone constitute about six-tenths of the total value of exports, and of these wheat represents one-half. The leading articles of import are tea, fish, wines and liquors, raw cotton and cotton goods, raw meats, coal and coke, wool, gum and resin, leather, silk, chemicals and dyes, metal goods, and machinery. The leading articles of export, besides the grains, are eggs and dairy products, timber, flax, hemp, furs and leather, oil cakes and oleaginous seeds, fowls and game, and petroleum. About two-fifths of the imports come from Germany, and one-fifth from Great Britain; while of the exports about one-fourth goes to Germany, the same to Great Britain, and over one-tenth to the Netherlands. The trade with the United States amounted in 1905, according to the Russian figures, to \$20,584,000 for imports and \$1,830,000 for exports, while according

to the United States returns Russia's imports from this country amounted in the same year to considerably less and her exports here were considerably greater. The discrepancy is due to the fact that American exports to Russia, as well as Russian exports to the United States, are primarily consigned to intermediate ports, and it seems probable that the trade between the two countries is in reality greater than is indicated by the official returns of either country. A direct steamship line was started in 1907 between Libau and New York.

Owing to the immense distances to be traversed and defective means of communication, fairs are still a notable feature in the internal trade of Russia. The most famous of these, held annually at Nizhni-Novgorod, attracts merchants from Western Europe, as well as from Central Asia and China. About \$85,000,000 worth of goods are sold here every year.

Communication and Transportation.—The wagon roads are poor and inadequate, and in the spring and autumn almost impassable. In winter the hard dry snow makes an excellent roadbed for innumerable sledges, and in summer the rivers serve as the principal means of transportation. There are 76,500 miles of navigable waterways in European Russia, exclusive of Finland, and these—rivers and canals—connect the Arctic and the Baltic with the Caspian and Black seas.

The railway mileage of the empire amounted in 1906 to 41,634 miles (over 8,000 miles in Asia), having increased about 60 per cent. during the preceding decade. At the beginning of 1907 there were about 2,300 miles in construction. The government owns nearly three-fourths of the total mileage, and constructs nearly all the new lines. The great Trans-Siberian railway (*q. v.*), stretching across the Asiatic continent to the Pacific Ocean, was built by the government, primarily for strategic reasons. The posts and telegraphs are owned and operated by the government and are a source of revenue. The telegraphs have over 256,000 miles of wire.

The mercantile marine consists of about 3,500 steamers and sailing vessels, with a tonnage totaling nearly 700,000. The number of ships entered and cleared at the ports of the various seas in 1905 was 22,941, of 21,637,000 tons, exclusive of the coasting trade, which is about half again as large. The most important ports are on the Baltic and Black seas, and they are blocked by ice for several months of the year, excepting Hangö and Libau on the Baltic, and Odessa, Sevastopol, and Novorossysk on the Black Sea. Ice-breakers are in regular use.

Banking.—The Bank of Russia is the state bank, as well as a commercial bank. It has 113 branches in different parts of the

empire. It issues the paper money of the empire, which according to law must be guaranteed by 50 per cent. of the total issue in gold up to 600,000,000 rubles, and by the full gold equivalent for every issue above that sum. On Jan. 1, 1906, the total issue of paper money was 1,206,000,000 rubles, while the gold guarantee fund stood at 985,000,000 rubles, or 81.7 per cent. of the total paper issued. By the law of 1895 the ratio of paper to gold money was declared to be as 1 to 1½.

The state banks for mortgage loans to the nobility had made loans to the nobles, up to Jan. 1, 1905, of over 749,000,000 rubles. The state bank for the purchase of lands by the peasantry had advanced to village communities, associations, and individuals over 507,000,000 rubles up to Jan. 1, 1905. About half the land of private land proprietors is mortgaged to the various mortgage banks. The number of state, municipal, and postal savings banks at the beginning of 1906 was 6,604; the depositors numbered 4,990,000, and the deposits totaled 1,835,000,000 rubles.

Money; Weights and Measures.—The legal unit of money is the silver ruble, equivalent to \$0.515. The ruble is divided into 100 kopecks. There are 5-ruble, 7½-ruble (half-imperial), 10-ruble, and 15-ruble (imperial) gold coins. The unit measure of length is the arshin (=28 inches), divided into 16 vershóks. The sazhen consists of 3 arshins. The verst consists of 500 sazhen, and equals 3,500 feet, or nearly two-thirds of a statute mile (0.662,879). The desyatin equals over 2⅔ acres (2.69972). The pound equals nine-tenths of the American and English pound (0.90283), and the pood contains 40 Russian or 36 American pounds. The vedró (divided into 8 shtoffs) equals 2.7056 gallons, and the chétvert (divided into 8 chetveriks) equals 5.7719 bushels.

Language.—The Russian language, which has three principal dialects, Great Russian, Little Russian, and White Russian, belongs to the Slavonic group of languages. Its alphabet has thirty-seven letters, its written and printed characters are of a peculiar form, and its pronunciation difficult for any but natives to acquire. Its highly inflected forms, with seven cases and numerous verbal modifications, increase its difficulty; but it is soft, rich, and sonorous, and has proved itself a fit vehicle for every kind of literature. A church dialect was created by the translation into Russ in the tenth century of the books of worship, with the retention of many Greek forms. This dialect, which still remains distinct, has considerably modified the vernacular. In copiousness the Russian language is excelled by few living tongues. In augmentatives and diminutives its richness is remarkable, as is also the fertility of its roots in forming deriva-

tives. According to Shishkov as many as 2,000 derivatives are often formed from a single root. By the use of inflections great freedom of construction may be attained, the connection of a phrase not being dependent on the grammatical order of the words. The language has great capacity for rhyme and poetical expression.

Literature.—Russian literature, as commonly understood, was hardly full-born before the middle of the eighteenth century, and emerged from its infancy only in the "Fables" of Krylov (1809) and the "History of Russia" by Karamzin, who died in 1826, leaving his work unfinished. The cause of this late literary development is found in the barbarous condition of Muscovy, as Russia was called till the reign of Peter the Great.

The lives of Russian and Pole, upon the Dnieper and Vistula, were originally alike. But the Poles, stimulated by Western culture and Christianized from Rome, long preceded the Russians in literature, the latter having received their religion and alphabet from Greek sources. The Greek Church long supplied Russia with saints and martyrologies and ecclesiastical chronicles. The earliest folk-songs, tales, and legends (*bilini*) had told of the old gods of their nature worship; later was begun the celebration, in mythic, romantic, or semi-historic form, of the great events and heroes of Russia's twilight history. Round the first Christian chieftain, Vladimir, the King Arthur of Russia, was built up the Kievan legend cycle. The awakening national spirit was embodied in the peasant hero of this cycle, Ilia of Muron, the chief of the bogatyr (heroes), and a sort of Hercules. And as the warlike Kiev had its Iliad, so the commercial city of Novgorod had its Odyssey, the Ulysses of which was Sadko, the rich merchant who passed through a wonderful series of maritime adventures. Russia's great agricultural class also had its hero in Mikula Selianinovich, a sort of Slav Triptolemus, "the divine personification of the race's passionate love of agriculture, striking with the iron share of his plow the stones of the furrow, with a noise that is heard three days' journey off." Moscow, also, had a popular hero, of the style of the English Robin Hood, in Stenka Razin, the bold robber of the Volga. Besides these *bilini*, chanted in irregular meters and depending on accent for their effect, the olden Russians had a rich folklore and folk-song. There were the festival songs (*stikhi*) sung by the blind *kalieki*, or wandering psalmists, the fête and bridal songs (*obradnia piesni*), the Christmas songs (*koliadki*) and the dance songs (*khorovods*). Later grew up a type of prose *bilini*, so to speak, of which the most notable relic is the "Story of the Expedition of Prince Igor," a bardic celebration of

the expedition of the year 1185 against the Tatar tribe of Polovtsi. Another, "Zadonschina," recites the victory of Dmitri Donskoi over the Tatars at the battle of Kulikovo (Field of Woodcocks). Drakula, a cruel prince of Moldavia, supplied the theme in the fifteenth century. In the folklore of these old days first appeared the *lieshie* (wood-demons), *vodiani* (water-sprites), *rusalki* (naiads), and *domovoi* (house-spirits). There were, furthermore, the usual lives of the saints (these, however, were Byzantine productions), and even some of the mediæval legends common to all Europe.

But strictly Russian literature may be said to have begun with Nestor, the monk of Kiev (c. 1056-1116), who was undoubtedly inspired by the rich associations of that sacred city to write his country's history. Among the bones of the saints in the Monastery of the Catacombs at Kiev lie the remains of the old chronicler. Ilarion, Metropolitan of Kiev, had even before Nestor interpolated a panegyric on Prince Vladimir in the middle of a "Discourse on the Old and New Testaments." Nestor was acquainted with the Byzantine historians and with the native *bilini*, many of which he undoubtedly incorporated bodily into his works. He had the credulity of a Livy. Much of his information he gathered from the lips of two of the oldest inhabitants of the region. He inspired a host of chroniclers, and thousands of annalists in the different Russian towns continued his records. Besides these annals we have glimpses of old Russia in a few curious works, portraying the antique barbarism from kitchen to royal chamber, bare of the romantic adornment afterward applied by Karamzin. We gain a painful notion of the humiliation of the Russian woman of that ancient empire. In his so-called "Chronograph," Sergius Kubasor, son of a boyar of Tobol, draws the portrait of the tall, ugly, and lean Ivan the Terrible himself.

Even when Russia under Peter the Great was just having her eyes opened to European civilization, and when under Elizabeth and Catharine II. she was falsely imitating the French and the prevalent classical styles, there was no want of national themes. Lomonosov told of the taking of Khotin, and Catharine herself (in her lyric drama, "Oleg") narrated the first march of the Russians on Constantinople. Catharine also satirized Gustavus III. in her "Gore Bogatyr" (Unfortunate Hero), just as Pushkin later revealed the treachery of the hetman Mazeppa, in his "Poltava." But the genuine national note was not to be struck until Karamzin drew attention to the rich material of Russia's past. Peter the Great's European tour and his founding of St. Petersburg led to a reign of French fashion in literature as well as art and

manners. The Russian ambassador to Paris, Prince Antiochus Kantemir, a friend of Montesquieu, wrote satires, and Lomonosov became Russia's Malherbe. He labored to free the modern Russian language from the Cyrillic alphabet and the Slavonic of the church. His "Odes" and his panegyrics of Peter and Elizabeth were his masterpieces. The Russian theater had begun to exist, and Sumarokov wrote many comedies, a play concerning "Demetrius the Pretender," and even translated some of Shakespeare's dramas. This French, or pseudo-classical, era was intensified in the reign of Catharine II. (q. v.). Under her royal favor all the Russian court imitated the French classicists of the seventeenth century and the *philosophes* of the eighteenth. Catharine herself wrote many plays and stories, after the French fashion, as well as her interesting memoirs as a grand duchess. She founded a Russian Academy in imitation of the French Academy. She encouraged Fonvizin, the comedy writer, and Kniajnin, who besides his comedies attempted a historical drama in "Vadim of Novgorod." Kheraskov composed a national epic, "The Russiad," and Gabriel Derzhavin—the successor to Lomonosov—sang the glories of Catharine and of Russian arms. His "Ode to God" has become known outside of Russia. Ivan Chemnitz translated the fables of Gellert and foreshadowed Krylov. This imitation of French models was the basis of Russian literature till the excesses of the opening of the French Revolution startled Catharine II. Then she prohibited the publication of French books in her dominions. But even aside from politics, the French artificial style had begun to pall on the Russians. Fonvizin, in his comedy "The Brigadier," had derided those whose only reading was French romances; and Kropotov, in his "Funeral Oration of Balabas, My Dog," congratulated that animal on never having read Voltaire! With the Napoleonic invasion the national spirit burst forth in the most bitter and violent odes and writings of a "patriot war." In tragedy, Ozerov wrote "Dmitri Donskoi," recalling the struggles of Russia against the Tatars. Kriukovski wrote the tragedy of "Pojarski," the hero of 1612. The poet Zhukovski sang the exploits of the Russians against Napoleon and stirred all anti-Napoleonic Europe with his "Minstrel in the Russian Camp." Even the childlike Krylov satirized the French fashions of the Russian court in "The School for Young Ladies" and "The Milliner's Shop."

The great literary event of the reign of Alexander I. was the appearance of the "History of Russia" by Nikolai Mikhailovitch Karamzin, already referred to. Before Karamzin there was no inspiring picture of Russia's past. Faithful pictures of the old barbaric Russia had been given, besides the

chronicles mentioned above, in the "Russkaia Pravda" (code) of Yaroslav (see below under *History*); in the "Instruction" (*Pouchenie*) of Vladimir Monomachus, which describes the life of a Russian prince at the beginning of the twelfth century; and in the "Book of Household Management" (*Domostroi*), said to have been written by the monk Sylvester in the reign of Ivan the Terrible, in which the Tatar influence on Russian life is clearly discernible. But these bald records of barbarism were not attractive. It needed the pen of Karamzin to cast a halo about the old Slav warriors. He admired Ivan the Terrible. After the fashion of Scott he put a romantic gloss over the real coarseness. He stirred the imagination and the patriotism of his countrymen. Pushkin became the laureate of Nicholas I. and Russia's greatest poet; Gogol mirrored in his Cossack tales the life of Little Russia; and Ivan Turgenev revealed the misery and despair of the serf, and caught the rising mutterings of Nihilism. Ivan Krylov, the Russian La Fontaine, supplied his countrymen with distinctively national fables, abounding in vigorous pictures of Russian life. Pushkin was succeeded by Lermontov, known as the poet of the Caucasus, and by Nicholas Nekrasov. Lermontov's first noteworthy ode was an appeal to Russia to avenge the killing of Pushkin in a duel, lest she receive no more poets. His lyrics are wild and varied and beautiful as the scenery of the Caucasus and Georgia. Nekrasov's realistic poems present the melancholy feature of Russian life. Taras Shevchenko was the national poet of Little Russia. His grave near Kaniov on the Dnieper is marked with a cairn and cross and is a patriotic shrine for all the Ukraine.

The novel, which came to be of chief importance in Russian literature, was first cultivated by Zagoskin and Lazhechnikov under the Scott-like influence of Karamzin, and reached its height of terrible realism in the minutely psychological stories of Dostoevski, whose "Crime and Punishment" is his masterpiece, and of Count Lyof Tolstoy, as in "War and Peace," "Anna Karenina," and "Resurrection." In other works he advocated a return to primitive Christianity and an extremely literal observance of the precepts of Jesus. To the names of these novelists should be added that of Maxim Gorky, perhaps the most tragic realist of all. Nihilism had its most famous novelist in Stepniak, who lived in exile, mainly in England, during his later years. Two young Russian women, Marie Bashkirtseff and Sonya Kovalevsky, have won attention by their startling revelations of an inner soul life that mirrors the yearnings and woes of modern womanhood.

History.—About the middle of the ninth century, when the Russians, the eastern branch of the Slavonic group of Aryan peo-

ples, emerged into the light of history, they were centered chiefly along the line of the Volkhov and Dnieper rivers, extending from the Valdai plateau, the great watershed of Russia, and Lake Ilmen, to the southern steppe, and from the Carpathian mountains to the eastern affluents of the Dnieper. The latter constituted at that time the extreme limit of Slavonic settlement to the E., except in the N. E., where the sources of the Oka, a branch of the Volga, had already been occupied by the Viatitchi, a Russian tribe. With that sole exception, the entire basin of the Volga, which now constitutes the backbone of the Russian empire, was occupied by various Finnish tribes. From the sea the Russians were shut off in every direction: from the White Sea, by the Finns; from the Baltic Sea, by Finns and Lithuanians; from the Black Sea, by various nomadic tribes, probably of Turkish origin, Petchenegs, Polovtsi, and others; and from the Caspian Sea, by the powerful state of the Khazars, a people of mixed Turko-Finnish stock, which was erected in the eighth century in the basins of the lower Volga and the Don, with its capital, Itil, on the lower Volga. This original habitat of the Russians, itself the result of a Slavonic migration from the Carpathians eastward, is a noteworthy fact, for until very recent times Russian history consisted, in the main, of an almost uninterrupted series of expansive movements in every direction of the compass, until the seas were reached. Excepting, however, the westward movement, which was the latest in point of time and was directed by political motives, the impelling motive was not the desire to reach the sea, but the need of a primitive agricultural system for indefinite expansion.

The nucleus of the early Russian social organization was the village community. There were various tribes, but apparently no distinct tribal organization, and so weak was the tribal bond that very soon even the names of the tribes cease to be mentioned by the chroniclers. On the trade routes, the most important of which was along the Volkhov, Dwina, and Dnieper, from the Gulf of Finland to the Black Sea, there were a few cities, among which Novgorod in the N. and Kiev in the S. played a conspicuous historical rôle. There were numerous rudely fortified places for security in case of war.

The Arabian historian Masudi (*q. v.*), of the first half of the tenth century, calls the eastern Slavs by the name of Volinana, which is identical with the Russian word Voliniane, denoting the inhabitants of Volin or Volhynia (*q. v.*). Masudi tells of them that at first they ruled over all the other Slavonic tribes, but internal quarrels broke them up into separate tribes, so that they became the prey of the Avars (*q. v.*),

The village community, based on a primitive agriculture, and to a large extent also on the principle of kinship among its members, did not permit of the union of large numbers to form a state, and in the earliest as well as in later Russian history the cohesive force had to be applied from without. The Byzantine emperor Maurice (c. 539-602), who fought the Slavs in person, tells of them that "they live in woods and on the banks of rivers, in small hamlets, and are always ready to change their abode. They love liberty, cannot bear unlimited rulers, and are not easily brought to submission." Their strong democratic bent is also attested by Procopius (born about 500), who says that "from the remotest period the Slavs were known to live in democracies; they discussed their wants in popular assemblies." In the *vetches*, or village public assembly, unanimity was the required rule; hence whole days would be passed in stormy debates and free fights would frequently ensue, until the grumbling minority, particularly if a small one, would be forced to acquiesce. In the boisterous republic of Novgorod unruly members of a stubborn minority would be thrown over the bridges into the Volkhov river, and that would end the debate. Among the early privileges of the popular assembly was that of choosing a ruler, and it was of this privilege that, according to the chronicler Nestor, the Slavs of Novgorod, the Tchudi (Finns, or Slavs settled in the Tchud country), and the Krivitchi made use when, having grown tired of the endless quarrels among themselves, they sent (about 862) to the Varangians and invited a certain Rurik, from the people called Russ, to come and rule over them. Rurik accepted the invitation and came over with his brothers Sineus and Truvor. Rurik established himself, first on Lake Ladoga, and later at Novgorod; Sineus on White Lake (Bielo-ozero); and Truvor at Izborsk, near Lake Peipus.

Who these Varangians were is no longer a matter of dispute. The names of the first Varangian rulers of Russia were all Scandinavian, and are met with in the Scandinavian sagas. Rurik is merely a Russianized form of *Hrörek*. The name Russ, which the eastern Slavs obtained from their Varangian rulers, comes from the Finnish word *Rootsi*, designating the Swedes. The Varangians are thus identified with the Northmen, the dreaded Vikings, who about the same time were plundering the coasts of Western Europe from the English Channel to the Ægean. Arabian and Byzantine annalists inform us that the Varangians, for purposes of trade and plunder, had for years been descending the Dnieper and the Volga, in order to reach, in the one case, the shores of the Black Sea and Constantinople, and, in the other, Itil, the capital of the Khazars, and the shores of the Caspian.

These routes were known to the Varangians as the *Austervegr*, i. e., the eastern route. By their military superiority and habit of obedience to their chiefs, the Varangians were able to impose upon the Slavs, from Novgorod to Kiev, that small measure of unity which was required in a primitively agricultural country for carrying on a limited amount of rudimentary traffic. The tribes and cantons paid a tribute to their new rulers, but for the rest their simple and spontaneous social organization remained undisturbed. The people retained their ancient right of discussing public affairs in folk-motes, and even of choosing their rulers, with the sole restriction that they had to be selected from the house of Rurik. The country was divided among the members of the house of Rurik and the leaders of the faithful band, which was named by the Russians *druzhina*; but the fiefs were revocable, not permanent and hereditary.

As soon as the Varangians took possession of Kiev they began to embark on expeditions against Constantinople. Askold and Dir—Varangian chieftains who had established themselves at Kiev independently of Rurik and were conquered and slain by Rurik's successor, Oleg—had done so before; Oleg (879-913), as soon as he had united the northern and southern Varangian principalities and made Kiev his capital, did the same. Constantinople (*Mikligardr*—the Great City) was ever to the barbarians in the E. what Rome was to them in the W., the glittering prize, the goal of their ambition. In 907 Oleg conducted a large expedition across the steppe and the Black Sea to the gates of Constantinople, where he received a large ransom and an advantageous commercial treaty; the latter was renewed in 911. Igor (912-945) was defeated in his first expedition (941), but according to Nestor retrieved his fortune in a second expedition (944), which is, however, not mentioned by the Byzantine chroniclers. The treaty concluding the second expedition, which is given in full by Nestor, contains on the Russian side fifty names, of which three are Slavonic and the rest Norse. This points to the beginning of a fusion of the two races. Igor was killed by the Russian tribe of the Drevliane, from whom he was attempting to extort an excessive tribute, and was succeeded by his wife Olga (945-964), who acted as regent during the minority of their son. She was the first of the house of Rurik to become a Christian (948). By that time there probably were a number of Christians at Kiev, for Askold and Dir had already accepted baptism after their defeat before Constantinople, but the mass of the Russians were still pagans. Olga's son and successor, Sviatoslav, the first ruler of the house of Rurik with a Slavonic name, was

a typical pagan Northman. His short reign (964-973) was signalized by a crushing defeat administered to the Khazars, which greatly increased the power of the robber hordes of the steppe, and by the great war against the Byzantine Empire for the possession of Bulgaria. Sviatoslav had been invited to assist the emperor against the Bulgarians. Having defeated the latter, he determined to retain possession of his conquest and to remove his capital from Kiev to Pereyaslav, on the Danube—this being one stage nearer to Constantinople. In the end his army was annihilated, and on his return march to Kiev he was ambushed and killed by the Petchenegs of the steppe. Before he had left for the Byzantine expedition, he divided the country among his three sons. To Yaropolk he gave the grand principedom and Kiev, while Oleg and Vladimir were designated the princes respectively of the Drevliane and Novgorod. From the civil war that followed his death, Vladimir (see VLADIMIR I.), who had fled to Scandinavia and brought over a new Varangian band, emerged victorious; and he reunited the principalities under his sway. His reign (980-1015) was filled with wars against the Petchenegs, and is made memorable by his acceptance of Byzantine Christianity as the state religion (988). At his death—again following the custom of Norse conquerors, who regarded their conquests as their patrimony—he divided the country among his sons. This division was, moreover, dictated by the conditions of the time. Money being but rarely employed and all payments being made in service and in kind, it was necessary to provide the members of the ruling family with lands and subjects. The lack of means of communication and the difficulty of ruling from one center so vast a country as Russia even then was, was another reason for distributing authority. From the division we learn what was the extent of Russia at that time. Yaroslav received Novgorod; Iziaslav, Polotsk, in the N. W.; Boris received Rostov, and Gleb received Murom (both in the N. E., being new Russian settlements in the Finn country); Sviatoslav was to rule over the Drevliane; Vsevolod received Vladimir, in Volhynia; Mstislav received Tmutorakan, an outlying possession in the extreme S. E., on the lower Don; and his nephew Sviatopolk received the principality of Turov, in the country of Minsk, which had been founded independently by a Varangian named Tur, who was not of the family of Rurik. It is strange that Kiev, with which went the grand principedom, is not mentioned in this list. Again followed a fraternal war, in which the Poles for the first time figure in Russian history, and which ended in Yaroslav becoming grand prince. His reign (1019-54) marks the culminating point of Varangian Russia. He crushed the

power of the Petchenegs, whose place is soon filled by another of those innumerable swarms from Central Asia, the Polovtsi; he despatched the last Varangian expedition against Constantinople, which ended disastrously; he founded Yuriev (the later Dorpat, now again "Russified") in the country of the Tchudi, Finns of the N. W., and Yaroslavl on the upper Volga, among the Meria, Finns of the N. E.; and he published the "Russkaya Pravda," the first Russian code of laws, as well as the first church law. The code bears numerous traces of its Scandinavian origin, such as the laws respecting private revenge, the payment of wergild, trial by ordeal or combat, and the compurgatory oath.

During the Varangian period the loosely united Russian state had remained undivided for the sole reason that, the succession being universally recognized to be limited to the family of Rurik, the grand princes had in most cases left but one son and heir. Whenever the case was otherwise, as after the death of Sviatoslav and Vladimir, the brothers straightway entered upon a struggle that ended with the death of all but one, who became the grand prince. By the law of succession in the Rurik family, as established by Yaroslav, the eldest son became grand prince of Kiev and supreme judge and general, who disposed of the unoccupied principalities. The younger sons received, according to their seniority, II. Chernigov, III. Pereyaslav, IV. Smolensk, V. Vladimir in Volhynia. None of the brothers was excluded from the succession. The death of the grand prince brought the prince of Chernigov to Kiev, and all the others moved one step nearer to the throne. But if one of the brothers died before attaining to the highest dignity, his sons were forever excluded from the succession to the grand principedom and could only reach the position their father had occupied. This class of excluded princes were known as *isgoi*. The period of the principalities is filled with attempts of younger brothers and excluded princes to become masters of Kiev, whence resulted civil wars, the multiplication of principalities, and the final disappearance of the grand prince's supreme authority. The Russian historian Pogodin (*q.v.*) enumerates during this period 64 principalities that existed for a longer or shorter time, 83 civil wars, 293 princes contending for Kiev or minor principalities, 14 invasions of the Polovtsi of the steppe, and 18 campaigns against them, besides other wars. During this period of turmoil and confusion there was one notable prince working for peace and order, Vladimir II. (Monomachus), who finally became grand prince (1113-25). It was largely owing to his endeavors that congresses of the princes were held in 1097 and 1100 to settle their various claims. During his reign we meet

with the first social reform legislation, for class differentiation had by this time developed considerably, due mainly to the constant wars and lack of security. Peasants had been obliged to borrow money at the rate of 120 per cent.; Vladimir ordered the rate cut down to 20 per cent. The status of the half-free peasants (*zakupi*) was regulated. They were declared bound to the soil, but could acquire property of their own and were not subject to the masters' jurisdiction; an unsuccessful attempt to escape, however, led to the complete loss of freedom. During the one hundred years following the death of Vladimir II., till the appearance of the Tatars, Kiev was the frequent scene of strife for the grand princely dignity, and once (1169) the city was captured by an army of Russians from the newly colonized country in the N. E. and given over to pillage. Finally the grand princely dignity was assumed by princes who had minor princes subordinate to themselves, and we have grand princes of Chernigov, of Galicia, etc. The decline of Kiev is due to several factors besides the civil wars. 1. Every new grand prince brought a new following of nobles and fighting men from his old principality, and this made impossible the growth of an indigenous landed nobility with a political tradition. 2. Its geographical position exposed it to the inroads of the nomads from the steppe. 3. The trade with Greece had declined owing to the increasing dangers of the journey through the steppe to the sea.

Meanwhile there was growing up a new Russia in the N. E., on the banks of the Oka and the Volga, where was formed the principality of Suzdal-Rostov, with its subordinate principalities of Tver, Riazan, Yuriev Polski, Vladimir on the Kliasma, and Pereyaslav Zaleski. The foundation of Moscow in 1147 is attributed to Yuri Dolgoruki, Prince of Suzdal-Rostov, who was grand prince at Kiev during 1154-57. His son Andrew Bogolubski (1157-75) was the first Russian prince to aim at absolutism. In this he was favored by the nature of the new country, for here the colonists settled on land that belonged to the prince and in cities founded by him, while the colonists themselves came from different parts of Russia and were not connected by bonds of kinship. The princes and great nobles (*boyars*) who stood in his way Andrew expelled from his dominions, and he removed the capital of his principality from Suzdal to Vladimir, where there were no refractory citizens with republican traditions. He assumed the title of grand prince and made himself virtual overlord of the greater part of Russia, but disdained to go to Kiev. He was a precursor of the later autocrats of Moscow, and was assassinated by his nobles. His brother Vsevolod (1177-

1212) maintained the supremacy of Suzdal over the N., and to a smaller extent also over the S. His death was followed by a war between his two sons; finally Yuri reigned undisturbed (1218-37), but he exercised no influence whatever over the S., which was devastated by nomads, Poles, and Hungarians. Southern Russia lay exhausted, unable to withstand the oncoming flood of Tatars.

The Mongol Tatars had established under Genghis Khan (*q. v.*) an empire extending from Northern China to the Caspian Sea. In 1222 they crossed the Caucasus and entered the South Russian steppe, driving the Polovtsi before them. The latter appealed to the Russian princes for aid. The grand princes of Galicia, Kiev, and Chernigov marched with their armies against the Tatars, crossed the Dnieper, and in June, 1223, suffered a crushing defeat on the Kalka river. The Tatars, who were still engaged in the completion of their Asiatic conquests and in the consolidation of their vast empire, were not prepared for a Russian campaign and turned back. The Russians soon forgot them. But in 1237 they came back under Batu Khan, a grandson of Genghis Khan, took a new route, conquered the Bulgarians of the Volga and other Finnish tribes, stormed Riazan, Suzdal, Vladimir, and Moscow, destroyed them, massacred the inhabitants, and defeated Yuri II., Grand Prince of Vladimir, on the Sit (March 4, 1238). In 1239-40 Batu Khan ravaged Southern Russia, and destroyed Kiev, Chernigov, and other cities. The whole of Russia, with the sole exception of the republic of Novgorod, was now under the Tatar yoke. In 1242 the city of Sarai was founded on the Akhtuba, a branch of the lower Volga, as the capital of the western division of the Tatar empire, denominated the Golden Horde of Kiptchak and extending from the Caspian to the mouth of the Danube and over the entire Volga basin. Here the Khan received the homage of the Russian princes, whom he nominated or confirmed, and here was brought the tribute collected by the Khan's tax farmers. For the rest, Russian conditions were left undisturbed. The Khan did not interfere between the princes and their subjects, did not molest their religion, appointed as princes only members of the house of Rurik, and even permitted them to wage war on their own account. Thus Alexander Nevski, Prince of Novgorod, defeated the Swedes in 1240 on the Neva, and the Teutonic Knights of Livonia on Lake Peipus in 1242. In recognition of his deeds the Khan made him Grand Prince of Vladimir (1252-63). Alexander's descendants were destined to play an important rôle in Russian history. His son Daniel (1263-1303) was the real founder of the principality of Moscow. Daniel was succeeded by his son Yuri.

Another son of Alexander, Michael, was Prince of Tver, and a third son, Andrew, was Grand Prince of Vladimir. In 1304 Andrew died, and Michael of Tver and Yuri of Moscow hastened to the Khan to beg for the favor of being appointed grand prince of Vladimir. Thus began the feud between the two branches of the house of Alexander Nevski, which was to last nearly thirty years, and which was fought with the basest weapons of intrigue, calumny, and assassination. At first Michael of Tver, being the senior, was appointed grand prince; but in consequence of the denunciations of Yuri, who married in 1315 a sister of Khan Uzbek, Michael was murdered in 1319, and Yuri was named grand prince. The death of Michael was avenged on Yuri by his son Dmitri in 1325, and Alexander, a second son of Michael, was named grand prince. In the principality of Moscow Yuri was succeeded by his brother Ivan. In consequence of a revolt of the Tverians in 1328 against the Khan's tax collectors, the whole territory of Alexander was laid waste by the Tatars, who were aided by Ivan of Moscow, and the latter was made grand prince. Alexander was executed in the following year.

With Ivan I., surnamed Kalita (the Purse), who ruled from 1328 to 1341, begins the supremacy of Moscow in Northern Russia. The means by which that supremacy was achieved were sufficiently despicable, and for its maintenance they were developed by Ivan Kalita into a method, a regular line of policy, to be faithfully followed by his successors. This method consisted in playing the abject tool of the Khan, gaining his confidence, borrowing his power, using it against his princely rivals, and absorbing their possessions. No Russian prince made as many journeys to the Horde as Ivan. With the wealth he accumulated from his extensive mercantile ventures he bribed the Khan and his officials. Having persuaded the Khan to install him his tax collector throughout the Russian principalities, there was opened to him a new and more extensive source of enrichment and bribery. By a bribe the metropolitan of the Russian Church was induced to remove his seat from Vladimir to Moscow, which thus became the religious capital of Russia. By bribes the boyars of other princes were induced to attach themselves to the rising star of Moscow. By bribes and constant exhibitions of the most abject submission, the Khan was induced, against the regular Tatar policy, to continue the grand principedom in his house. It was during his reign that a large part of Western Russia was incorporated in the rising power of Lithuania. But Ivan was not moved thereby to a single action and never swerved from the policy he had mapped out for himself, to preserve and consolidate the

power of Moscow, whatever might happen to the rest of Russia.

Ivan's sons and successors, Simeon the Proud (1341-53) and Ivan II. (1353-59), continued the policy of conciliating the Tatars and of gaining the support of the boyars by augmenting their power at the expense of the princes. For a short time the grand principedom then passed from Moscow to Suzdal, but owing to dissensions among the Tatars it was restored to Moscow in the person of Dmitri Donskoi, son of Ivan II. (1362-89), the only prince of Moscow who dared appeal to the arbitrament of the sword against the foreign oppressor. But although he defeated them (Sept. 8, 1380) in the memorable battle on the field of Kulikovo on the Don (whence his surname), owing to the absence of their Lithuanian ally, Prince Yagiello, yet so exhausted was Russia by that dearly purchased victory that in 1382 the Tatars were able to penetrate even into Moscow, which they burnt, and Dmitri was compelled to wear once more the galling yoke of subjection. To do away with the ever present menace of wars of succession, Dmitri substituted the law of primogeniture for the old law of seniority. His son Vasili I. (1389-1425), who followed him in accordance with the new law, returned to the dishonorable but successful policy of Ivan Kalita in his relations with the Golden Horde. During his reign the Lithuanians captured Smolensk (1404) and the river Ugra was made the boundary between Moscow and Lithuania. He was succeeded by his son Vasili II. (1425-62), surnamed the Blind, a weak ruler, whose reign was filled with personal misfortune. His succession was contested in the name of the old law, first by Yuri, his uncle and a son of Dmitri Donskoi, and later by a son of Yuri, who captured him and caused him to be blinded (1446). But the Khan was gained over by a show of abject submission, and the people of Moscow showed their preference for the new rule of succession in so marked a manner that his temporarily successful rival was compelled to desist. Thus even during the reign of the ineffectual Vasili II. the unity of the Muscovite possessions was maintained unimpaired, while the power of the Golden Horde was waning by the splitting off of the independent khanates of Kazan and the Crimea. The end of Tatar rule over Russia was fast approaching. Vasili's son Ivan III. (1462-1505) was a true successor of Ivan Kalita, cold, calculating, and cowardly, but patient and successful. The principalities of Tver, Rostov, Yaroslav, and Vereya are incorporated with the immediate possessions of Moscow; an end is made of the great republic of Novgorod, and its commerce is ruined for all time; Vyatka, a daughter republic of Novgorod, is also annexed; the khanate of Kazan is made

tributary; and the hand of Moscow is extended over Perm, the silver-bearing country on the western side of the Urals. By his marriage with Sophia Palæologa (1472), a niece of the last emperor of Byzantium, and his adoption of the Byzantine double-headed eagle, Ivan put forward claims to an authority higher than any Russian grand prince before him had dared to assert, styled himself Grand Prince and Lord (Gosudar) of all the Russias, and was enabled to maintain his claims by means of the cannon which Aristotle Fiovarenti of Bologna, who had come in the company of Sophia, had built for him. He foreshadows later czars by invading Livonia, where cannon were used by the Russians for the first time in the siege of Fellin (1482), and by putting himself forward as the champion of the Orthodox religion in Lithuania, where extensive conquests of old Russian territory were made, including Chernigov; and although the Russians were defeated by the Teutonic Knights with great slaughter in the battle of the Siritza (1501), yet Ivan retained his Lithuanian conquests by the treaty of peace of 1503. But the greatest event of Ivan's long reign, the final freeing of Russia from Tatar domination, is the one of which he could least boast. Having for a long time bribed the Khan and deceived him, and having then put to death the Khan's envoys who came demanding homage and tribute, he gathers an army of 200,000 men to oppose to the invading Khan. Yet he dares not strike a final blow. For months the two armies were confronting each other, until the Tatars withdrew. During their retreat the Tatars of the Horde were annihilated by Ivan's allies, the Nogay Tatars. Thus Russia became free at last of the Tatar yoke not by its own act, but by the slow process of its foe's internal dissolution. Moreover, the Tatar power was not yet completely broken. Again and again the separate hordes invaded Russia, carrying off tens of thousands of prisoners, and they even appeared menacingly under the walls of Moscow.

Ivan left the bulk of his dominions to his second son, Vasili III. (1505-33), born of Sophia. The other sons had to content themselves with comparatively small possessions, in which, moreover, they exercised no independent authority, for they had no right to coin money or to dispense higher justice. Thus did the principle of a hereditary and indivisible monarchy finally triumph. The last independent Russian republic, Pskov (1510), and the last independent principalities, Riazan and Novgorod-Seversk (1521), were annexed by Vasili, who also gained Smolensk from Lithuania (1514), which he retained notwithstanding the disastrous defeat of his troops on the Orsha. There were also several expeditions against Kazan, which

had revolted, but without decisive results.

Ivan IV., "the Terrible" (1533-84), was three years of age at the death of his father, Vasili III. During his childhood he suffered much from the rudeness of the proud boyars, who were fighting for supremacy at court. He was crowned in 1547 and assumed the title of Czar (Cæsar) as the sole and legitimate successor of the Byzantine emperors. In 1552 he conquered and annexed Kazan, and in 1557, Astrakhan, thus making the entire Volga basin Russian. Ivan was anxious to establish permanent relations with the Western powers and to import the arts of the West. Following upon Richard Chancellor's discovery of a sea route to Muscovy by way of the White Sea, the English navigator having landed in 1553 at the mouth of the Northern Dwina, Ivan granted England the most extensive trading privileges, even to the prejudice of his own subjects, and sought to enter upon a treaty of alliance with her. In 1557 Ivan commissioned the Saxon Hans Slitte to engage for him in Germany scholars, physicians, artists, printers, and artisans. Slitte engaged 123 men, but the Livonian Knights would not allow them to pass through for fear that the growing Muscovite power, already menacing and terrible, would become irresistible if permitted to acquire the arts of civilization. Ivan therefore determined to conquer for himself an outlet on the Baltic, and in 1558 a Russian army captured Narva, Dorpat, and other places. But this ultimately involved him in a war with Poland and Sweden, and by the treaty of 1582 Ivan was compelled to surrender all his conquests in that direction. During this protracted war Ivan's enemies found an ally in the Tatars of the Crimea, who in 1571 raided the country, burnt Moscow, and carried off 100,000 prisoners. They came back the following year, but were effectually driven back. The Czar could console himself for his loss of Livonia by the acquisition of Siberia (*q.v.*), which the Cossack and brigand chief Yermak conquered for him in 1580. Ivan's reign was marked by innumerable acts of bloodshed and atrocity.

Ivan was succeeded by the feeble-minded Feodor (1584-98), a younger son, who left the government to his all-powerful minister, Boris Godunov, his wife's brother. Feodor was childless, and Dmitri, another son of Ivan, a mere child, was the heir apparent. But in 1591 Dmitri was found murdered, Godunov being generally supposed the author of the murder in order to clear the path to the throne for himself. The name of Godunov is associated with one of the most memorable edicts issued by any Russian ruler; namely, the edict binding the peasants to the soil, issued in 1592. Thus serfdom, which by that time existed in fact

over a large part of Russia, was legalized and made the normal status of the peasantry. As a result they emigrated in large numbers and joined the communities of the Cossacks, irregular military republics, which had grown up both east and west, on the Don as well as on the Dnieper, in the debatable border country, which was *de facto* neither Tatar, nor Russian, nor Lithuanian. Being for the most part Christians and, moreover, Orthodox, the Cossacks were ever ready to raid the Tatar settlements, in the service of Lithuania, or of Moscow, or on their own account; but at times, as policy and their own advantage dictated, they did not shrink from joining the forces of the infidels against their fellow-Christians. Besides war and brigandage, they also engaged in hunting and fishing. Their camps became the refuge of the enslaved, the distressed, the indebted, the discontented, and the adventurous. In 1597 an edict prescribing the most vigorous measures for the recovery of fugitive serfs was issued by Godunov. In 1598 was founded the Russian patriarchate, with its seat in Moscow. In the same year Feodor died and Boris Godunov was elected czar by a general assembly (*sobór*) specially convoked for the purpose. Thus ended the house of Rurik.

Godunov was an able ruler, but he was detested by the boyars, who looked upon him as an upstart, as well as by the common people, upon whose enslavement he had put the stamp of legality. Three years of bad crops and famine, accompanied by pestilence, completely undermined his rule and prepared the ground for Dmitri the Impostor, who claimed to be the Dmitri, son of Ivan and brother of Feodor, who was murdered at Uglich. The impostor invaded the country with a Polish force, and while the campaign was still undecided, Boris suddenly died (April 13, 1605). His son, Feodor II., was murdered, and Dmitri entered Moscow (June 10, 1605). He soon showed himself to be a friend of Poles and Germans, Roman Catholicism, and the ways of the West, and was killed (May 17, 1606) in a revolt headed by Vasili Shuiski, an able general, of an old boyar family. An assembly of boyars and Moscow citizens proclaimed Shuiski czar, but he had to take oath that he would condemn no one to death without trial, that he would not confiscate the estates of criminals, and that he would punish the false denunciators. Shuiski's reign (1606-10) was full of turmoil. The boyars were unruly, the people restless, new pretenders arose—a second false Dmitri and a pretended son of Feodor II. Shuiski was compelled to abdicate and retire into a monastery. The years 1610-13 constitute an interregnum during which Russia was the prey of accumulating horrors. Robber bands, escaped serfs, and Cossacks roved through the country, burning and plunder-

ing. Sigismund III. of Poland proclaimed himself a candidate for the Russian throne, and a Polish army marched upon Moscow. The Novgorodians chose a son of Charles IX. of Sweden. The boyars compromised by electing Ladislav, son of Sigismund, and Polish troops entered Moscow. There followed a national Russian-Orthodox uprising, led by the butcher Minin, of Nizhni-Novgorod, and Prince Pozharski. A Russian army marched upon Moscow and the Polish garrison was compelled to leave the city (1612). The following year a general assembly was held, and young Michael Romanov, son of the metropolitan Philaret of boyar family, was elected czar.

The reign of Michael (1613-45) was necessarily devoted almost entirely to the restoration of domestic tranquillity and external peace. By the Treaty of Stolbovo (1617) the Swedes gave up Novgorod in return for Karelia and Ingria, which were ceded to them. A Polish army under Ladislav appeared in 1617 under the walls of Moscow, but was repulsed. In the following year an armistice for fourteen years was concluded with the Poles, which was confirmed by the Treaty of Polianovka in 1634. Ladislav gave up his claim to the Russian throne, and the Czar surrendered his claims to Livonia, as well as to the ancient Russian territories of Chernigov, Seversk, and Smolensk. This armistice brought back from his long Polish captivity Philaret, the father of Michael, who was chosen metropolitan and who thenceforth was formally and actually associated with his son in the government. The reign of Michael's son Alexis (1645-76) saw the resumption of Russia's efforts toward reaching the Baltic and regaining its old possessions. A part of Livonia was conquered from the Swedes, but after the ineffectual siege of Riga all the conquered territory had to be restored in the Peace of Kardis (1661). On the other hand, the war against Poland resulted in a vast accession of territory (1667). Polotsk, Smolensk, Seversk, Vitebsk, Kiev, and the whole of Little Russia E. of the Dnieper was acquired. This unparalleled success was due, in the main, to the widespread revolt of the Cossacks of the Ukraine from Poland in 1648 and their voluntary acceptance of a Russian protectorate in 1654. In the Far East also the Russians under Khabarov occupied the valley of the Amur. But notwithstanding these great successes in foreign policy, the people grew more and more discontented with their hard lot. In 1648 and 1662 there were revolts in Moscow, and in 1670 the entire Volga basin was aflame. The Volga rebels were finally overcome by the government troops, and 12,000 were gibbeted on the highway. Their leader, Stenka Razin, was executed at Moscow. It was also during the reign of Alexis that the first great schism in the Russian

Church took place. The patriarch Nikon, author of the reforms (revision of the song and prayer books, etc.) leading to the schism (1655-56), had also demanded the right to participate in the general government of the country, as Philaret had done before him under Michael; but for this he was deposed from the patriarchate by a great council of the church.

Alexis was succeeded by Feodor III. (1676-82), his eldest son by his first wife. The most important act of this reign was the destruction of the books of pedigrees, which determined the rank of each family and the offices to which it was entitled. This was the so-called *mestnichestvo*, or privilege of place according to rank, which had been the cause of endless mischief to the state, for men would frequently refuse to accept orders from one of inferior descent even on the field of battle. Feodor died childless, and the sixteen-year-old Ivan, who was next in the line of succession, was an imbecile. Therefore Peter, the third son of Alexis by his second wife, was proclaimed czar, though only ten years old; but a strong party, supported by a revolt of the Strelitz (*q. v.*), demanded and obtained a joint czarship of Ivan and Peter, under the regency of Sophia, a daughter of Alexis by his first marriage (1682-96). In 1689, by the Treaty of Nertchinsk with China, Russia gave up the valley of the Amur. In the same year young Peter fled to the fortified monastery of Troïtsa, called the faithful nobles and foreign corps to his aid, punished the leaders of the Strelitz, deposed Sophia, and sent her into a convent. Ivan retained the title of czar until his death in 1696, but henceforth Peter was practically sole ruler.

In 1695 Peter marched against the Turks and laid siege to Azov. Failing that year, he took the fortress in 1696 and marched triumphantly into Moscow. The following year he left Russia on his travels. (See PETER I.) In the Northern War against Sweden (1700-21) he lost the battle of Narva, Nov. 30, 1700, but the battle of Poltava, July 8, 1709, delivered him from all fear of his great rival, Charles XII., and enabled him to acquire, at the expense of Sweden, a port on the Baltic. The Swedish king persuaded Turkey to declare war against Russia, and on the banks of the Pruth Peter, surrounded by an immense Turkish army, found himself in a critical position. He concluded a treaty (1711) giving back Azov. In 1721 the Peace of Nystad ended the Northern War, Sweden granting to Russia the possession of Livonia, Esthonia, Ingria, Karelia, and a part of Finland. Peter was equally successful against Persia, which in 1723 ceded the provinces of Daghestan, Shirvan, and Ghilan, with the towns of Baku and Derbent.

Peter's innovations and reforms began immediately after his first return from abroad, when he directed his attention to the dress and outward appearance of his subjects. The Asiatic garments, the long caftan, had to give way to German attire. Beards, which the Russians had hitherto considered as sacred, were to be shaved. A certain tax had to be paid for the privilege of wearing one. Among Peter's social reforms was the emancipation of women. They had been kept secluded for centuries. Peter instituted assemblies, where the sexes met, danced, and conversed. He introduced women into the life of the salon, and to the manners of Western Europe. He established a new conception of nobility, based upon the service of the czar. A gentleman or a noble was one who entered the czar's service, whether of Russian or foreign birth. The hereditary nobility had thus to give way to the officers of state, who were divided into fourteen grades. His attempts to introduce primogeniture failed. He divided the manufacturers and merchants into guilds, the first and second of which enjoyed many privileges. The remaining privileges of certain classes of peasants were abolished, and all were reduced to a common level of serfdom. Among his administrative reforms was the institution of the senate in place of the ancient *duma* of the boyars. He abolished the flagellation of debtors. Torture, though retained in criminal cases, was abolished in civil law. The police was reorganized, and a state inquisition was instituted. To provide money for the army and navy the state revenues were increased. The poll-tax and the tax on stamped paper were introduced, and many other means of raising money were devised. Peter also encouraged commerce and industry, and negotiated treaties with European states. Among those who opposed his reforms, the clergy, in particular, expressed dissatisfaction with the "German Czar." Peter therefore abolished the patriarchate and instituted the Holy Synod.

Always borrowing from the West, learning, and applying his acquired knowledge in Russia, Peter not only Europeanized his army and created a navy, but also founded schools and colleges, museums and libraries. The Bible was translated into Russian and sold at popular prices. Artists were invited from abroad, and Russians were sent to the West to study. In 1724 the Czar established in St. Petersburg the Academy of Sciences, the first members of which were foreigners. The Slavonic alphabet was abandoned and replaced by the new Russian alphabet. The old Slavonic, however, remained in use in the church. Printing was encouraged, and the "Gazette of St. Petersburg" (the first Russian newspaper) was established. The manner of calculating the year from the creation was abolished, and

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the beginning of the year was counted from January 1 instead of from September 1.

Peter's wife and successor, Catharine I. (1725-27), guided and supported by Menshikov and other favorites, made likewise many important improvements. She increased the army and navy, diminished the taxes, and recalled the exiles from Siberia. She concluded an offensive and defensive alliance with Austria, and sent an ambassador to China to propose a commercial treaty. (See CATHARINE I.) According to her will she was succeeded by Peter II. (1727-30), a grandson of Peter I., and only eleven years old. Although a council of tutors had been appointed, Menshikov seized the sole control of public affairs, but was himself within six months displaced by Prince Dolgoruki, exiled to Siberia, and his property confiscated. After the sudden death of Peter, the crown devolved on Anna (1730-40), the daughter of Ivan. An attempt was made to force on her a "capitulation," restricting the rights of the crown in favor of the boyars; but Anna soon discarded the compact, exiled the princes Dolgoruki and Galitzin, abolished the privy council, and reorganized the senate on an entirely new basis. The Kirghiz (*q. v.*) in 1731 submitted to the protectorate of Russia, but the Persian provinces were lost by the Treaty of Resht (1732), and by the conquests of Nadir (1736). During her reign the N. E. coast of Siberia, the Aleutian and Bering islands, were discovered, and the whole of Siberia incorporated with the empire. In the civil war of Poland Anna took sides with Augustus III., who promised to her favorite, Duke Biren (*q. v.*), or Biron, the duchy of Courland, then a Polish fief. The success of Augustus secured the Russian influence in Polish affairs. In the war against Turkey, Field Marshal Count Münich conquered Moldavia; but when Austria concluded the unfavorable Treaty of Belgrade (1739), Russia also laid down her arms and gave up Moldavia. (See ANNA IVANOVNA.) After Anna's death, her grandnephew Ivan VII. (1740-41), a child only a few months old, became czar under the regency of his mother, Anna Karlovna; but soon he was dethroned by Elizabeth Petrovna (1741-62). In the first years of her reign Sweden was instigated by France to a war against Russia, which was terminated in 1763 by the Peace of Abo, and secured to Russia the possession of some districts of Finland. In the Seven Years' War Elizabeth supported Austria, and the battles in which it participated apprised Europe of the great improvements introduced into the Russian army. Under her reign the death penalty and the rack were abolished, but sentences of exile were numerous. She greatly advanced the interests of science and literature. (See ELIZABETH PETROVNA.) She was succeeded

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by Peter III. (1762), the son of her sister, and formerly Duke of Holstein, who immediately on his accession gave up the alliance with Austria, and concluded a peace and soon after an offensive alliance with Frederick the Great of Prussia. After a reign of only a few months Peter lost the crown and his life by a court conspiracy.

Peter III. was succeeded by his wife, Sophia Augusta, of Anhalt-Zerbst, who ascended the throne as Catharine II. (1762-96.) During her reign Russia gained a leading and decisive influence in the system of European policy, and was without further dissent recognized as one of the great powers of Europe. Catharine soon after her accession recalled the Russian troops from the Seven Years' War. She surrounded her throne with a host of illustrious statesmen and warriors. She took a prominent part in the nefarious dismemberments of Poland (*q. v.*), receiving herself the lion's share; and in a number of successful wars she wrested from the Turks the Crimea, Azov, and several other territories. Grusia in 1783 submitted to her protectorate; Jever, in Oldenburg, fell to her crown in 1793 by inheritance; and in 1795 Courland paid homage to the Russian scepter. The territory of Russia was enlarged during her reign by nearly 225,000 square miles, and the population increased by several millions. The internal progress was no less signal. More than 50,000 industrious foreigners settled in the fine agricultural districts of Southern Russia, and many new educational and charitable institutions were established. Commerce, navigation, and industry prospered and greatly improved under her fostering care; the administration of the empire was thoroughly reorganized; and in 1766 she convoked a general assembly of delegates from the provinces to consult respecting the compilation of a new code of laws. (See CATHARINE II.) Her son, Paul I. (1796-1801), took an active part in the European war kindled by the French Revolution. He formed a defensive and offensive alliance against France, with England, Austria, Naples, and Turkey. Three Russian armies were sent in 1799 against the French republic, and greatly strengthened the Russian influence on European policy. Dissatisfied with his allies, Paul soon recalled the army, concluded with Denmark and Sweden, in December, 1800, a convention of armed neutrality, and even made friendly advances toward France, when a conspiracy led to his assassination.

Paul's son, Alexander I. (1801-25), was strongly inclined in favor of a peaceful policy, though he found it impossible to keep out of the general war. He mediated in 1801, in concert with France, the Peace of Lunéville, which involved the dissolution of the Holy Roman Empire. In 1802 and 1804 he incorporated with Russia all the

provinces of Georgia. He soon entered into an anti-French alliance, saw his troops beaten at Austerlitz, at Eylau, and at Friedland, and was forced to conclude peace at Tilsit (*q. v.*), ceding the Ionian Islands to France and Jever to Holland, while he received from Prussia the government of Bialystok. Russia had to give its adhesion to the continental system (*q. v.*) and to close its ports to British vessels. A war with the Turks, instigated by Napoleon, terminated in favor of the Russians, who occupied Moldavia and Wallachia. Complications with England and Sweden ensued, but for five years after the Treaty of Tilsit Alexander remained on good terms with Napoleon, and in 1809 he received from Austria the district of Tarnopol, in 1812 from Turkey Bessarabia and a part of Moldavia, and in 1813 from Persia the former conquests of Peter the Great, Daghestan and Shirvan. Another great war with France became inevitable when Alexander, Dec. 13, 1810, set aside one of the provisions of the Treaty of Tilsit. In 1812 Napoleon marched an army of 500,000 men into Russia. The Russians lost the bloody battle on the Moskwa (see BORODINO), and even Moscow fell into the hands of the French; but the burning of the city by the Russians in September was soon followed by the retreat of the French, during which nearly their whole grand army was destroyed. On Feb. 28, 1813, Russia was joined in her war against France by Prussia, and on Aug. 19 by Austria; and two months later the battle of Leipsic (*q. v.*) decided the issue of the war, which in 1815 terminated with the exile of Napoleon to the island of St. Helena. In the congresses of Vienna in 1815 and Aix-la-Chapelle in 1818, which reorganized the political relations of the European states, the influence of Russia was paramount. Alexander was intent on promoting the civilization of his empire and developing its immense resources. Thousands of German colonists, after 1817, peopled the wastes of Bessarabia and the Caucasian countries, the system of public instruction was greatly improved, religious reforms were encouraged, and serfdom had been abolished in Courland and Livonia in 1809. See ALEXANDER I.; NAPOLEON BONAPARTE.

The death of Alexander was followed by the outbreak of a conspiracy. The nearest heir to the throne was Alexander's brother Constantine, but he renounced the crown in favor of his brother Nicholas. But the commanders of some regiments stationed in St. Petersburg, who aimed at the establishment of a constitutional form of government, proclaimed Constantine as the rightful czar. This rising, known in Russian history as the revolt of the Dekabrists (Decembrists), ended in far-reaching persecution. Several leaders were hanged and 116 others were sent to Siberian mines. The insurrection

failed, because the cry for political liberty found no echo among the masses. Autocracy once more triumphed, and Nicholas (1825-55), having quelled this revolt, became henceforth the very incarnation of absolutism. In his home government he claimed entire obedience, and in his foreign policy he was always on the side of oppression. A war, begun by Persia immediately on receiving the intelligence of the death of Alexander, was victoriously terminated by Paskevitch; and by the Treaty of Turk-mantchai, Feb. 22, 1828, Russia gained the provinces of Erivan and Nakhitchevan and exclusive control of the Caspian Sea. As a result of war with Turkey (1828-29) the Turks ceded several fortresses on the frontier and the mouths of the Danube. The heroic efforts of the Polish nation in 1830-31 to recover its independence at length succumbed to the overwhelming power of the Czar, who in 1832 declared Poland a Russian province and announced his intention gradually to transform the Poles into Russians. The same plan was pursued with regard to the numerous other nationalities and tribes of the empire, and no means was therefore left untried to extend the dominion of the Russian language and religion. In 1839 a synod of United Greek bishops was prevailed upon to decree the separation of their dioceses from Rome, and their reunion with the Russian Church, and notwithstanding numerous protests of priests and congregations the decree was rigorously executed by the government. From 1834 a war against the independent tribes of the Caucasus was carried on, with but little interruption, through the entire reign of Nicholas, who found it impossible to complete their subjugation. Later events in this reign were the furnishing of aid to Austria in suppressing the Hungarian revolt (1848-49), and the Crimean War (*q. v.*), of which Nicholas did not live to see the end.

Nicholas was succeeded by his son Alexander II. (1855-81). By the Treaty of Paris in 1856, ending the Crimean War, Russia abandoned her right to interfere in internal matters in the Danubian principalities. The Black Sea was neutralized, and Russia lost the right to keep her ships of war there. In spite of the unfavorable issue of the war Russia extended her dominion in the Caucasus until finally Schamyl (*q. v.*), the mountaineer chief, was compelled to surrender after a valiant struggle, and the Caucasus fell wholly under Russian sway. The emancipation of the serfs in 1861 was one of the greatest events in Russian history, although the hopes and expectations centered in that act have been but partially realized. More than 22,000,000 were liberated, the landlords received an indemnity, and a portion of the soil became the property of the serfs. In 1863 another Polish insurrection

broke out. The Poles were still dreaming of independence, and in spite of the liberal measures of the Czar manifestations in the streets and churches of Warsaw were frequent. Alexander was ready to grant concessions, but the discontent continued and the insurrection spread all over the country. In 1864 it was quelled, and Poland lost the last vestiges of her independence. The Russian language was introduced in all schools and at the University of Warsaw, and became obligatory in all official documents. In the meantime Russia was advancing steadily in Central Asia. Turkestan, Khokand, Samarkand, Bokhara, and Khiva were annexed. In 1858 Russia acquired from China the left bank of the Amur, and Vladivostok was founded. In 1877 Alexander espoused the cause of the Slavonic Christians and war with Turkey followed. The siege of Plevna (*q. v.*) became famous for the magnificent defence under Osman Pasha. The war ended in 1878. (See BERLIN, TREATY OF; SAN STEFANO, TREATY OF.) Russia received an inadequate compensation for her struggle. Bismarck and Lord Beaconsfield were afraid of Russia's expansion and of her influence in Europe, which Alexander continued to extend till the day of his assassination. See ALEXANDER II.

During the reign of Alexander III. (1881-94) all the reforms of his father were abandoned, and an era of reaction began. No war troubled Russia's external peace, but within the country discontent increased. Nihilist plots (see NIHILISM) and massacres of the Jews were frequent. Austria, Germany, and Italy formed the Triple Alliance, and friendly relations were established between France and Russia. The Russification of the western provinces, which Nicholas I. had begun, and which Alexander II. had discontinued, was again attempted. The University of Dorpat was Russianized, and in 1890 it had to conduct its courses in Russian.

Upon the death of Alexander III. his oldest son, Nicholas II., succeeded to the throne (1894). Under him the Russian people looked for a more liberal administration, but their hopes were not at once realized. The Czar adhered to the policy of Russification of the outlying provinces, and in Finland especially coercive measures were vigorously employed. Manchuria (*q. v.*) was made virtually a Russian province through the construction of a branch of the Trans-Siberian railway and the possession of Port Arthur, and this domination continued till it was broken by the Russian reverses in the Russo-Japanese War (*q. v.*). In 1898 Nicholas issued a proposal for a peace conference to all the important states of the world. The conference was held at The Hague in 1899, and there a second conference met in 1907. Meanwhile at home the Czar's reactionary policy, expressly directed

against the popular liberal movement, brought on a serious internal crisis, unrest spreading far and frequently breaking into open revolt. Between 1902 and 1907 many political assassinations occurred, among the victims being the Grand Duke Sergius (1905), long regarded as the Czar's evil genius. Anti-Semitism (*q. v.*) inflicted many outrages upon Jews, its violence culminating in the atrocities committed at Kishineff (*q. v.*) in 1903, and there and elsewhere subsequently. In 1905 the Czar issued a ukase granting religious liberty throughout the empire, and in the same year he issued a manifesto providing for a national Duma (*q. v.*) or parliament, representing all orders of the people, including a large representation of the peasantry. The first Duma (May 10 to July 21, 1906) was dissolved by order of the Czar; the second (1907) shared the same fate; the third, which met in November, 1907, was elected by a restricted suffrage and contained a majority representing the reactionary landed nobility. Its president, however, declared that Russia is no longer an autocracy, but a constitutional monarchy.

HERMAN SIMPSON.

Russia Leather, a kind of leather originally made in Russia, and since imitated elsewhere. It is strong, pliant, and waterproof, and resists mildew. The oil of birch used in its preparation gives it a distinctive aromatic odor that is an efficient safeguard against insects. These qualities render it especially useful in bookbinding. The process used in tanning it was a secret until, through the investigations of Marshall Jewell, United States minister to Russia in 1873-74, it was introduced into America. See LEATHER.

Russo-Japanese War. Although Japan had captured Port Arthur in 1894, and it was ceded to her at the end of her war with China, Russia had persuaded the European Powers to constrain Japan to give it up, and accept a small indemnity instead. In 1897 a Russian fleet wintered at Port Arthur with China's consent, and in 1898 the Liao-Tung Peninsula was leased to Russia for 25 years, and that government expended many millions in fortifying the port and building great wharves and government offices at Dalny, near by, as for permanent occupation. She also extended her Siberian railway across Manchuria to Vladivostok, and down to Port Arthur, and with keen enterprise pushed down into Korea also. All this was bitter to Japan, who needed her friendly relations with both Korea and Manchuria, and saw in Russia's advance a great peril to her own existence. Russia had agreed to evacuate Manchuria by October, 1903 (still retaining Port Arthur and the peninsula, and guarding her railroads). But this was not done, and diplomatic in-

terchanges between Japan and Russia strenuously debated the situation, Russia seemingly playing a game of wearisome postponement—disclaiming designs on either Manchuria or Korea, yet extending her holdings in both.

At last, on Feb. 6, 1904, Russia sent a note of such dilatory reply to Japan's note of Jan. 13, that Japan instructed her minister in Russia to demand his passports, and gave the Russian Minister his. Diplomatic relations were at an end; and without further warning, on the evening of Feb. 8, the Japanese fleet, under Admiral Togo, attacked the Russian fleet at Port Arthur, inflicting great damage; attacking again on the 9th; while on the latter date Admiral Uriu, after landing 2500 troops at Chemulpo, Korea, attacked and sunk two Russian cruisers, the "Variag" and the "Koriets," in that harbor. Russia declared war formally on the 10th, and Japan on the 11th. The attack by Japan before declaration was protested against, but had plentiful historical precedent even in Russia's own history.

Secretary John Hay, for the United States, promptly addressed notes to Russia and Japan as to the neutralization of China in the contest, which was acceded to: China and Germany proclaimed neutrality; Great Britain was under alliance with Japan to aid her if attacked by any two Powers, but as between Russia and Japan alone, she, too, stood neutral, as well as France, who was in alliance with Russia.

Doubtless, Japan had for years foreseen the inevitable coming of this war, and with unparalleled sagacity, industry, and energy made preparation for it; as Russia, confident in her bigness, had not. Events followed fast. Togo immediately proceeded to bombard Port Arthur, and tried to block its entrance by sinking hulks in the channels. Up to April 15 he had made seven distinct attacks. On May 1 the Japanese General Kuroki, with troops that had been hurried forward, crossed the Yalu River (between Korea and Manchuria) at and above Wiju, driving the Russian forces of occupation north and west towards the Port Arthur and Mukden railroad. Gen. Oku landed troops on the Liao-Tung Peninsula, and seized Dalny (which the Russians evacuated, after destroying as much as they could of the splendid piers and buildings); and Gen. Nogi landed a large force there, prepared to invest Port Arthur from the northern land side, while Togo's fleet should operate from the sea. Oku meanwhile passed further north, and in a desperate battle took Nanshan Hill, which gave a key to the outer defences of Port Arthur. The great fortress, with its 50 encircling forts, was now completely invested, and for eight months, sturdily commanded by the

Russian General Stoessel, sustained a terrific siege.

Meantime, the Japanese pushed west to the northern railroad line, in three divisions, under Kuroki, Oku, and Nodzu, the Russians retiring before them, with fighting at many points. The unpreparedness of Russia was everywhere apparent, and as early as March the Viceroy Alexieff had been superseded as commander of the armies by Gen. Kuropatkin, who had the difficult task of holding the Japanese in check until the single-track Siberian Railway could reinforce him with men and munitions enough to make a stand. He did excellent work, although it is believed that he was hampered by instructions from St. Petersburg. In June (as is believed, against his own judgment) he sent Gen. Stachelberg, with 10,000 men, to try to relieve Port Arthur from its investment on the north; but in a three days' battle with Oku, Stachelberg was disastrously defeated at Vafangow, about 80 miles north of Port Arthur, and barely escaped with the remnant of his force. By the middle of July the Japanese had brought their three armies into mutual connection, facing Kuropatkin's enlarged force before Liao-Yang, which had been extensively and very strongly fortified. On July 20, Field-Marshal Oyama arrived, and took command of all the Japanese armies. Their advance had compelled the Russians to abandon Ying-Kow, the port of New-Chwang, on the gulf west of the Liao-Tung Peninsula, thus giving the Japanese still another sea-base for men and supplies.

In the end of the summer, from August 24 to September 2, was fought the great battle of Liao-Yang, in which nearly half a million men were engaged, with terrific fighting and enormous losses on both sides. The stubborn tenacity of the Russians and the rapidity and intensity of the Japanese were well offset; but at the last Kuroki flanked the Russian left, and Kuropatkin was beaten. His army tumultuously retreated, almost in a rout, although by splendid management the Russian commander retired his broken forces to Mukden. This gave the Japanese command of the railroad.

After a few weeks' rest for both armies and reorganization for the Russians, Kuropatkin issued a stirring proclamation to his army, alleging reinforcements of "hundreds of thousands," and giving order for an offensive advance. The day of retracy before superior forces was over, and henceforth "we shall compel the Japanese to do our will." Accordingly, from the 6th to the 17th of October came a series of bloody battles along the Shake (or Sha) River, the losses on both sides estimated at 70,000 men. The result, however, was a full check to the Russian advance, with the Japanese in possession of the field. Then ensued

floods of rain, which stopped all operations until the beginning of winter.

Meantime, the siege of Port Arthur had been going on with tremendous energy under Gen. Nogi. Continuous bombardments, desperate attacks on outer forts, equally desperate defence, scores of thousands of lives lost, until by Aug. 7 the chief points in the outer defences were taken. The capture of Wolf Hill, July 27, gave range for the bombardment of town, forts, and ships in the harbor, so that on Aug. 10 the fleet tried to escape. But they were caught and scattered or disabled by Togo on the sea, five of them getting back to port and seeking better shelter. Through summer and fall the work steadily progressed, until on Dec. 2 the Japanese took 203-Meter Hill, after a series of attacks, which Gen. Stoessel said cost them 20,000 men. But it was the beginning of the end; for it gave open line of fire upon the interior of the harbor, and eight great warships were sunk at their moorings, while town and inner defenses were battered, until on Jan. 1, 1905, Port Arthur surrendered. All the resources of modern engineering and skilful military art had been brought to bear, on both sides, with unsurpassed bravery and devotion. The Japanese acquired 50 forts, 775 large guns, 4 battleships, 2 cruisers, and other vessels, with 48,000 prisoners. It was estimated that the casualties on both sides were about 125,000. The Mikado recognized the splendid defence by ordering the honors of war to Gen. Stoessel and his officers, who marched out with their side-arms.

About the middle of Jan., 1905, the Russians made a costly and unsuccessful raid under Gen. Mistchenko to the west of the Hun and Liao rivers, to cut the Japanese communications; and on Jan. 25 began another extensive engagement, lasting six days, and resulting in another Russian repulse, with much suffering on the part of the soldiers from the bitter cold of the Manchurian winter. About the middle of February, the three armies of Kuroki, Oku and Nodzu were reinforced by Nogi's 100,000 victorious veterans from Port Arthur, and a fifth force under Gen. Kawamura had been in the mountains between the Russian left and Vladivostok. On Feb. 20 the Japanese, facing the Russians before Mukden in a vast semicircle, opened another general attack upon the strongly fortified and entrenched enemy, beginning it by an unexpected flanking of the Russian right at Sinmintin, by Nogi, who had marched straight up through the neutral territory of the Liao River—violating a neutrality, which, however, had already been voided by the Russians, who had passed army supplies across that zone. For 23 days ensued a series of terrific engagements, ending with another Russian rout, and leaving Mukden,

with its enormous stores of supplies, arms, ammunition, etc., in the hands of the Japanese. The Russians were not only defeated, but nearly surrounded, and only by desperate fighting escaped in broken bodies to the other side of Tie Pass (Tieling), where they rested—forty miles back of Mukden. Gen. Kuropatkin was now recalled from command, and succeeded by Gen. Linevitch, who reorganized the shattered army and gradually retired toward Harbin, 300 miles north of Mukden, the junction of the Port Arthur railroad with the Trans-Siberian line to Vladivostok, and a vital point to be guarded at all hazards. The estimate of forces engaged in the battle of Mukden were: Russians, 350,000; Japanese, 350,000 to 400,000. The losses, in killed, wounded and missing: Russians, 107,000; Japanese, 57,000. The combined losses, given as 164,000, however, are held by some to have been more than 200,000. It was a battle planned and fought with masterly skill by Oyama, and, with the foregoing operations, ranks him among the few greatest warriors.

For several months after this, there was not much activity of movement, except the slow advance of the Japanese towards Harbin, and the closing in of their forces about Vladivostok in apparent preparation for a land and sea investment. Minor reconnaissances and engagements occurred, but until June 16 no general movement; then the Japanese began what looked like strategical envelopment of Linevitch about Harbin and of Vladivostok, yet without much effective energy. It was thought that the long delay was in expectation of the issue of action by sea; to which it is time to turn.

After the destruction of Russia's Vladivostok ships, which Admiral Kamimura had caught in the Straits of Korea on one of their early raids, and so many of her Port Arthur fleet were disabled or shut up in that port, it was rumored that the Czar would send his Baltic fleet to the Far East. On Sept. 11, 1904, immediately after the battle of Liao-Yang, the Baltic fleet sailed from Cronstadt. In passing through the North Sea they fired into a fleet of English fishing-vessels, which they feared were Japanese torpedo-boats (18,000 sailing-miles from Tokio), killing and wounding a number of men. This created great excitement in England, but the authorities of Russia and Great Britain referred the matter to a court of inquiry under the Hague Convention (which decided that Russia should pay £65,000 indemnity). Admiral Rojesvenski, the Russian commander, proceeded to Vigo, Spain, whence the fleet sailed in two divisions, one through the Suez Canal and the other (with the Admiral) around the Cape of Good Hope. A third section came later. The divisions met in the Indian Ocean and then spent some months at the north end of

Madagascar. On March 17 they departed, steaming slowly across the Indian Ocean and up into the China Sea. For about two weeks, while on the French Indo-Chinese coast, Admiral Rojesvenski aroused indignation in Japan by taking in coal and supplies at the French harbors of Kamranh and Honkohe bays. Europe had been startled earlier by Russia's disregard of conventions, when, in July of the year before, two seeming merchant steamers passed out of the Black Sea through the Dardanelles (by general consent closed to warships) and after getting out into the Mediterranean mounted armament, and cruised about, seizing foreign vessels charged with conveying contraband of war to the Japanese. Several British ships were thus captured, and only after vigorous protest from Great Britain were these irregular operations stopped. The overfriendly hospitality of France to Rojesvenski's fleet at several French home and colonial ports, and finally at the Indo-Chinese harbors—was arraigned by Japan in formal protest, and a request from her ally, Great Britain, for information, made the matter one of great moment. The French government, however, gave explanations and excuses, and peremptorily ordered the Russian fleet to move on; and the affair was closed.

Slowly, still, Rojesvenski pursued his way, now northward, the world questioning whether he would circle outside of Japan or try the inner pass of the Korean Straits for his probable objective—Vladivostok. Togo, meanwhile, with his Japanese fleet had a secret base at Masampho, on the east coast of Korea, where, unknown to the world, he awaited the Russians,—his admirable scouting-vessels and wireless telegraphy informing him of their every move.

On May 27, before six o'clock in the morning, the Russian fleet came out of the fog, its 32 vessels in three columns, moving into the straits. Togo had disposed his fleet in three divisions—north, west and east of the approaching Russians. The battle that ensued was a crushing defeat—almost annihilation—for the Baltic fleet. At the distance of four and five miles, although on a rough and rolling sea, the splendid gunnery of the Japanese, with their devastating Shimose-powder shells, wrought havoc on the Russian vessels, while the untrained Russians bravely did their best to reply, but with little effect. One after another ship was made a single target for the Japanese fire, and sank or fled disabled. Two hours of the battle broke up all organized fleet-action by the Russians; the rest was intense, untiring pursuit and destruction by the Japanese. During the night following, a swarm of torpedo-boats and a few submarines came out to follow up the work; and in the early morning of the 28th

the battleships and cruisers again took up the pursuit, the sinking, or the capturing of vessel after vessel straining to escape northward. One cruiser and three destroyers arrived at Vladivostok; three cruisers made the Philippines, although in bad condition, and were there interned; and one destroyer got into Shanghai. The rest of the 32 vessels of the great Baltic fleet were sunk or captured. Of the 18,000 men, 14,000 sank with their ships, 1,000 escaped, and 3,000 were made prisoners. Among the latter were Admiral Rojesvenski, badly wounded, and Admiral Nebogatoff. The Japanese, on the other hand, lost three torpedo-boats sunk, and about 800 lives: the "Mikasa," Togo's flagship, having lost 63 in killed and wounded—more than any other vessel. (This vessel was accidentally blown up, by a fire and explosion of her magazine, on Sept. 12, 1905, after the conclusion of peace.) The Battle of the Sea of Japan, as Togo named it, ended all hope of Russia's efficiency by sea for years to come. It placed Japan sixth among the nations as a sea-power, and reduced Russia to the seventh place. During the war, Russia lost about fifty battleships, cruisers, and destroyers; Japan about nine (and not one of those surrendered). And despite her losses, Japan added to her naval strength in the war nearly 250,000 tons, in captures or the recovery of sunken Russian vessels. This battle raised the modest Togo to a first place among the most famous admirals of the world. While his strategical and tactical ability shone pre-eminent, it is clear that the distinguishing Japanese characteristic of "prearrangement,"—in discipline, training, thorough understanding and use of the latest scientific appliances for getting and transmitting information, for sanitation, for perfection of apparatus and skill in its application (all equally notable in the Japanese land operations)—must be added to the appreciation of this momentous naval event: and all reflects honor upon the names of Togo and his associate admirals—Dewa, Kataoka, Shimomura, and Uriu.

The stunning effect of this battle seemed to give pause to the war. The world at large began to look for peace. The movements towards Harbin and Vladivostok begun June 16, as noted above, were leisurely and without active hostilities. Meanwhile, President Roosevelt, on June 1 and 2, had conferences with the Russian and Japanese ministers at Washington, and learned directly through an interview with the Czar by the American Ambassador in St. Petersburg that such a step as he contemplated would not be deemed intrusive. And on June 7 he sent to Tokio and St. Petersburg an identical note, as follows:

"The President feels that the time has

come when, in the interest of all mankind, he must endeavor to see if it is not possible to bring to an end the terrible and lamentable conflict now being waged. With both Russia and Japan the United States has inherited ties of friendship and good will. It hopes for the prosperity and welfare of each, and it feels that the progress of the world is set back by the war between those two great nations.

"The President accordingly urges the Russian and Japanese governments, not only for their own sakes, but in the interest of the whole civilized world, to open direct negotiations for peace with each other. The President suggests that those peace negotiations be conducted directly and exclusively between the belligerents; in other words, that there may be a meeting of Russian and Japanese plenipotentiaries or delegates without any intermediary, in order to see if it is not possible for those representatives of the two Powers to agree to terms of peace."

Further, he said that while no intermediary should be summoned in, but the two Powers should arrange the matter between themselves, he would be entirely willing to do what he properly could, if they thought that his services would be of aid in arranging the preliminaries.

This was approved not only by the two Powers, who promptly acceded to the plan, but by the civilized world in the comments of the foreign press, and, as is believed, by personal assurances—even beforehand—from Edward of England, William of Germany, and Loubet of France. The place selected for the Peace Conference was Portsmouth, New Hampshire, U. S. A. (rather than Washington, in the summer weather). The envoys selected were: on the part of Japan, Baron Komura, Japanese Minister of Foreign Affairs, and Mr. Takahira, Minister to the United States; on the part of Russia, Sergius Witte, President of the Imperial Council (a famous conservative-liberal and finance minister), and Baron Rosen, Russian Minister to the United States.

The sessions began at Portsmouth on Aug. 9, 1905, and the Japanese presented the terms on which they would conclude peace. Most of these were accepted by the Russians, with some modifications, but the Conference seemed doomed to failure over the Japanese demand for repayment of their expenses in the war, and the cession of the island of Sakhalin (which the Japanese had captured on June 7th, after President Roosevelt had begun his efforts for peace). The Russians stolidly refused any indemnity ("Not a kopeck," said Witte) or any cession of territory. At this point President Roosevelt stepped in again, inviting alternately Mr. Takahira and Baron Rosen, and

Baron Kaneko (a special agent of Japan, not one of the commissioners), to interviews at his summer home, Sagamore Hill, Long Island, N. Y.; and it is believed that he also invoked and received the personal influence of King Edward and Emperor William with the Mikado and the Czar. Japan, although absolute victor thus far, really was in possession of no Russian territory, and therefore not in position to demand indemnity; and as to Sakhalin, she had formerly owned half of it without damage to Russia. The result was that Japan, recognizing the gravity of continuing the war on a question of money, magnanimously withdrew the demand for indemnity; and Russia, providing against possible trouble from the nearness of Sakhalin to the mouth of the Amur River and her Siberian territory by a condition that the island should not be fortified by either party, ceded the southern half of Sakhalin to Japan. The preponderating interest of Japan in Korea was to be recognized and not interfered with (although Korea's independence was to be guaranteed by both nations); both were to retire from Manchuria; and Japan was to retain Port Arthur and the Liao-Tung Peninsula as Russia's successor in the lease from China, together with certain railroads, mines, coast fishing rights, etc.

The "Treaty of Portsmouth" was signed by the commissioners Sept. 5, 1905. After all, therefore, Japan had won what she had warred for,—the possession of Port Arthur and the withdrawal of Russia from Korea and Manchuria, as well as various valuable concessions; while, beyond and above that, she had at one stride placed herself as an equal among the acknowledged great Powers of the world, compelling, in her renunciation of the indemnity, a recognition of her moral strength, as well as her marvellous energy, bravery, skill, advancement in science, and general greatness in all the arts and factors of civilization.

The world rang with praises of President Roosevelt, for his potent and wise personality in the diplomatic achievement of peace.

During the Conference there was no formal armistice, although the armies lay quiet, ready for either event; but at its close, matters were put formally upon a peace footing. Eighteen months were provided for withdrawing the mighty armies, which according to careful estimates had become gigantic in size,—the Russians being supposed to number 400,000, and the six Japanese armies to aggregate nearly 600,000.

Rutgers College, an educational institution in New Brunswick, N. J.; founded in 1766, under auspices of the Dutch Reformed Church; has endowment exceeding \$680,000; grounds and buildings, valued at over \$750,000; scientific apparatus, etc., \$140,-

000; volumes in library, about 60,000; ordinary income, \$225,000; average number of faculty, 50; average student attendance, 500.

Ruth, a short book now placed in the Hebrew Bible in the HAGIOGRAPHIA (*q. v.*), between the Song of Solomon and the Lamentations. The English Bible, following the Septuagint and the Vulgate, arranges it between the Books of Judges and Samuel. During the times of the Judges, a certain Elimelech, of Bethlehem-Judah, *i. e.*, of Bethlehem in Judah, as distinguished from Beth-lehem in Zebulun (Josh. xix: 15), to escape a famine then raging, went to Moab with his wife Naomi, and his two sons, Mahlon and Chilion, who married two Moabitesses, Orpah and Ruth. There all the male members of the family died, and the widowed Naomi, hearing that the famine was over, thought of returning home. Orpah, after starting with her, was prevailed on to return; Ruth, the heroine of the narrative, could not be persuaded to go back, and having, after reaching Bethlehem, gone into the fields as a gleaner, she attracted the notice of Boaz, an aged kinsman, with whom she made a romantic marriage, ultimately becoming the great-grandmother of King David and an ancestress of Jesus Christ (Matt. i: 5). The Book of Ruth is a beautiful idyllic composition. It was penned not earlier than the time of David (ch. iv: 22), and probably much later, for there had been time for customs existent in the days of Boaz and Ruth to change (7). The narrative is in pure Hebrew, but there are Aramæanisms in the dialogues. Most critics place its composition before, but Ewald during, the Exile. Its canonicity has never been doubted.

Ruthenians, Russinians, or Russniaks, numerous Slavonic tribes inhabiting Eastern Galicia, Bukowina, and Northeastern Hungary, closely allied to the inhabitants of Podolia and Volhynia. They live almost exclusively by agriculture, and their state of civilization is still very low. They belong for the most part to the United Greek Church, and in politics often prove troublesome to the Austro-Hungarian empire on account of their Russian proclivities.

Ruthenium, a tetrad metallic element discovered by Osann in 1828, in the platinum ores from the Ural, and first isolated by Claus in 1846. Symbol, Ru.; at. wt., 104. It occurs chiefly in osmiridium, and is separated from the latter by heating to redness a mixture of this ore and common salt in a current of moist chlorine. By digestion in cold water an extract is obtained from which ammonia throws down the oxides of ruthenium and osmium. The latter is expelled by heat, and the former converted into ruthenate of potassium by fusion with potash, which yields oxide of ruthenium on addition of nitric acid. Except

osmium, it is the most refractory of all metals, but can be fused in the hottest part of the oxyhydrogen blow pipe. It then has a density of 11 to 11.4, and is scarcely attacked by nitro-muriatic acid.

Rutherford, or Rutherford, Samuel, a Scotch divine; born in Nisbet, Scotland, about the year 1600. He studied at Edinburgh University, and in 1627 was appointed minister of Anwoth in Kirkcudbright. On account of his strong Presbyterian views he was deprived of his living in 1636 and imprisoned for two years, when he was restored. He took a prominent part in the drawing up of the National Covenant. In 1639 he became Professor of Divinity, and in 1649 principal of the new college, St. Andrews. He published numerous politico-theological treatises. The most famous of these is "Lex Rex" ("The Law, King"), which on the Restoration was publicly burned and he himself charged with high treason. Death prevented him from answering the charge before Parliament. His "Familiar Letters" have been frequently reprinted. He died in Edinburgh, March 29, 1661.

Rutherford, Lewis Morris, an American astronomer; born in Morrisania, N. Y., Nov. 25, 1816; was graduated at Williams College in 1834; admitted to the bar in 1837; and practised in New York till 1849, when he retired from practice to devote himself to travel and the study of astronomy. He made a number of instruments for his observatory, among which were an object glass which proved a great success, a micrometer for the measurements of astronomical photographs, a ruling engine with which he produced interference gratings on glass and speculum metal. He retired from active astronomical work in 1883, and presented his instruments to Columbia College. He was one of the original members of the National Academy of Science. He died in Tranquillity, N. J., May 30, 1892.

Ruthven, Raid of, in Scotch history, an act of treachery by which the Earl of Gowrie and his party, on Aug. 22, 1582, secured to themselves for 10 months the control over the person and power of James VI. The king, then only 16 years of age, was surrounded at Ruthven Castle, the seat of the Earl of Gowrie, where he had gone on a hunting expedition. He was set free by the opposition party at St. Andrews, June 29, 1583, and the Earl of Gowrie was beheaded.

Rutile, a widely distributed mineral, occurring mostly in crystals, occasionally massive; crystallization tetragonal; much twinned, by repetition of the same twin often assuming a geniculated appearance; hardness, 6 to 6.5; sp. gr., 4.18 to 4.25; luster, metallic-adamantine; color, red to

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reddish-brown, yellowish-black; streak, brown; transparent to opaque; fracture, sub-conchoidal to uneven; composition: oxygen, 39; titanium, 61 = 100, corresponding with the formula TiO_2 . Dana divides this species into: (1) ordinary, which includes the brownish-red and other shades; sp. gr., 4.18-4.22, and the acicular varieties often inclosed in rock crystal; (2) ferri-ferous; color black (a) nigrine, (b) ilmeno-rutile; (3) chromiferous, color grass-green, owing to oxide of chromium. Found distributed in granite, gneiss, mica-schists, and sometimes in granular limestones.

Rutland, a city and county-seat of Rutland co., Vt.; on Otter creek, and on the Rutland, the Delaware and Hudson, the Central Vermont, and the Bennington and Rutland railroads; 50 miles S. W. of Montpelier. Here are an English and Classical Institute, the Baxter Memorial Reference Library, Rutland Free Library, State House of Correction, city hospital, court house, United States government building, the first State Capitol (built in 1784), a State penitentiary; waterworks, street railroad and electric light plants, National and savings banks, and several daily and weekly newspapers. It is in a region rich in limestone, and marble has been quarried here since 1830. West Rutland, which was set off from Rutland in 1886, is the center of the marble interest. Besides its marble industry, Rutland has extensive scale works, iron works, and shirt and school furniture factories. The assessed property valuation is nearly \$5,500,000. In 1784-1804 Rutland was one of the State capitals. During the Revolutionary War it was on the frontier and was protected by two forts. Pop. (1900) 11,499; (1910) 13,546.

Rutledge, Edward, an American statesman; born in Charleston, S. C., Nov. 23, 1749; was admitted to the bar in 1773; began practice in his native town; was a member of the Continental Congress in 1774-1777; took a conspicuous part in the discussions preceding the adoption of the Declaration of Independence, of which he was a signer; was on a commission with John Adams and Benjamin Franklin which met Lord Howe, Sept. 11, 1776, on Staten Island, but refused to enter into any treaty with him except on the basis of American independence. He was lieutenant-colonel of the Charleston Artillery which aided in expelling the British from the island of Port Royal in 1779; and was captured in 1780 and imprisoned for a year in St. Augustine. At the conclusion of hostilities, he resumed the practice of law in Charleston; and was elected governor of South Carolina in 1798. He died in Charleston, S. C., Jan. 23, 1800.

Rutledge, John, an American jurist, brother of Edward; born in Charleston, S.

Ruyter

C., in 1739. He was a member of the South Carolina convention of 1774 that decided to take part in the Continental Congress, and a delegate to the latter body in 1775; chairman of the committee that framed the South Carolina constitution in 1776, and elected that year president of the new State government and Commander-in-Chief of the militia. In 1778 he was again elected governor of South Carolina. In 1780, when Charleston was captured by the British, he retired to North Carolina, joining Greene's army; but resumed the governorship at the close of the war. In 1782 he was elected to Congress, and reelected in 1783. He was a member of the convention that framed the Constitution of the United States. In July, 1795, he was appointed by Washington Chief Justice of the Supreme Court and served the August term of that year; but his mental faculties failing, he was not confirmed by the Senate in December. He died in Charleston, July 23, 1800.



ADMIRAL RUYTER.

Ruysdael, or Ruisdael, Jakob, a Dutch landscape painter; born in Haarlem, Holland, about 1625. In 1648 he was enrolled a member of the guild of St. Luke at Haarlem, and in 1659 was granted the freedom of the city of Amsterdam. His works are very picturesque in detail. The scenes were mainly taken from the neighborhood of Haarlem, partly from the districts of Germany that border on Holland. His work shows that he had a fine feeling for the poetic spirit of nature, which he embodies with great skill. His pictures exist in Dresden, Berlin (probably the two best collections), the Louvre, the London National Gallery, Amsterdam, and The Hague. He left a few etchings, which are highly prized. He died in the almshouse of Haarlem, March 14, 1682.

Ruyter (roi'ter), Michiel Adriaanszoon de, a Dutch naval officer; born in Flushing, Holland, March 24, 1607. From the situation of cabin boy he rose to the rank of

captain in the Dutch navy in 1635, and rear-admiral in 1645. He defeated and sunk an Algerine pirate squadron in 1647. He distinguished himself in the war with England and in the service of Denmark. In 1667, sailing up the Thames he destroyed the English shipping and burned several men-of-war. His victories led to the peace of Breda. After fighting the French fleet in the Mediterranean, he retreated to the harbor of Syracuse, Sicily, where he died of his wounds, April 29, 1676.

Ryan, Abram Joseph, an American verse-writer; born in Norfolk, Va., Aug. 15, 1839. It was while chaplain in the Confederate army that he wrote his well-known poem "The Conquered Banner," composed shortly after Lee's surrender. His works are: "The Conquered Banner, and Other poems" (1880); "Poems, Patriotic, Religious, and Miscellaneous" (1880); and "A Crown for Our Queen." Other popular poems are: "The Lost Cause," "The Sword of Lee," "The Flag of Erin," and the epic "Their Story Runneth Thus." At the time of his death he was engaged upon a "Life of Christ." He died in Louisville, Ky., April 22, 1886.

Ryan, Carroll, a Canadian author; born in Toronto, Ont., Feb. 3, 1839. On leaving the army, where he served during the Crimean War, he devoted himself to journalism and literature. He edited and published a number of Canadian newspapers, contributed articles and poems to magazines, and lectured on the Liberal side. His published works are: "Oscar, and Other Poems" (1857); "Songs of a Wanderer" (1867); "The Canadian Northwest and the Canadian Pacific Railway" (1875); and "Picture Poems" (1884).

Ryan, Patrick John, an American Roman Catholic prelate; born in Thurles, Ireland, Feb. 20, 1831. He was ordained deacon in 1853, completing his studies in St. Louis, Mo., and raised to the priesthood in 1854. In 1872 was elected coadjutor archbishop of St. Louis. His administration was energetic and successful. He was promoted archbishop in 1883 and in 1884 transferred to the see of Philadelphia. He wrote: "What Catholics do not Believe," "The Causes of Modern Religious Skepticism." He died Feb. 11, 1911.

Ryazan, a city and capital of a province of the same name in Central Russia, on the Trubesh, a tributary of the Oka, in the center of a rich agricultural district; has a large trade, more especially in rye. Manufactures include woollens, linens, needles, and leather. Pop. (1897) 44,552. The government has an area of 16,254 square miles, and is wholly drained by the Oka and its tributaries. The surface on the right of the Oka is largely swampy and has extensive forests; on the left it is

generally fertile. Cereals of all kinds are produced for export. The principal manufactures are cotton, linen, leather, and spirits. Pop. (1897) 1,827,539.

Rybinsk, or Rubinsk, a town in Russia, in the province of Jaroslav, on the Volga, at the confluence of the Rybinska. It is the center of the corn trade on the Volga, and commands an extensive commerce, being at the head of the canal and river system uniting the Baltic Sea with the Caspian.

Rydberg, Abraham Viktor (rid'berg), a Swedish author; born in Jönköping, Sweden, Dec. 18, 1829. He produced several translations, among them Goethe's "Faust"; a novel, "The Last of the Athenians" (1859), a picture of the last conflict between paganism and Christianity—translated into English, German, and Danish; many poems; a number of æsthetic and historical studies; and a series of works on the philosophy of religion, including "The Doctrines of Christ according to the Bible" (1862); "Magic of the Middle Ages" (1864); "Romish Legends of the Apostles Peter and Paul" (1871), and "The Primitive Patriarchs' Genealogies in Genesis" (1873). His "Teutonic Mythology" (1886) is a brilliant piece of work. He died in 1895.

Rye, *Secale cereale*. The glumes are one-nerved and shorter than the spikelet, the rachis is very tough; not known in a wild state. It is the prevailing grain cultivated in the S. of Sweden and Norway, in Denmark, Holland, the N. of Germany, and part of Siberia. It is cultivated to a small extent in England, and somewhat more extensively in America. It grows on poor light soils unsuitable for wheat. The value of rye is about two-thirds that of wheat; its nutritious properties are to those of wheat as about 64 to 71. When formerly mixed with wheat it was called meslin. It is the chief grain from which Holland gin is distilled. When rye is attacked by ergot it is said to be spurred. In the year 1909 the United States produced 32,239,000 bushels of rye, valued at \$23,809,000.

Rye Grass, the genus *Lolium*, specifically, *L. perenne*, an excellent grass to mix with others for permanent pastures, or to be sown free from admixture as part of the rotation of crops. The variety *L. italica* is more valuable than the normal type.

Rye House Plot, in English history, a conspiracy, planned in 1683, the immediate object of which was to assassinate Charles II. and his brother, the Duke of York (afterward James II.), as they returned from the Newmarket races. This plan was to have been executed on the road to London, near a farm called Rye House, belonging to one of the conspirators named Rumbold; but it was frustrated by the king and his brother happening to return from New-

market earlier than was expected. The detection of the plot led to the arrest, on a charge of high treason, of Lords William Russell, Essex, and Algernon Sidney, who were in no way connected with it. Essex put an end to his own life in the Tower, while Russell and Sidney were beheaded, as also Lieutenant-Colonel Walcot, one of the real contrivers of the plot.

Rye Starch, the starch of flour of rye. The granules are larger than those of wheat or barley, some being .0016 of an inch in diameter. The form of the largest granules is that of a flattened disk with a depressed center, having cracks on its outer edge. The hilum is central, with lines radiating almost to the circumference. Rice starch is sometimes used to adulterate wheat flour.

Ryle, John Charles, an English clergyman; born in Macclesfield, May 10, 1816; studied at Christ Church, Oxford; carried off the Craven scholarship, and was graduated with a classical first-class in 1837. He took orders, and was successively curate at Exbury, Hants; rector of St. Thomas', Winchester (1843), of Helmingham, Suffolk (1844); vicar of Stradbroke, Suffolk (1861); rural dean (1870); honorary canon of Norwich (1872); select preacher at Cambridge (1873-1874), and at Oxford (1874-1876). In 1880 he was nominated by Beaconsfield Dean of Salisbury, and before he had taken possession was raised to the newly formed see of Liverpool. A prominent member of the Evangelical party, Bishop Ryle wrote countless tracts of vast popularity, and the following books: "Coming Events and Present Duties" (1867); "Bishops and Clergy of Other Days" (1868); "The Christian Leaders of the Last Century" (1869); and "Expository Thoughts on the Gospels" (7 vols. 1856-1869). He died in Lowestoft, June 10, 1900.

Rymer, or Rhymer, Thomas the (Thomas Lermont of Erceldoune), a Scotch poet of the 13th century, who occupies an important place in the mythical and legendary literature of Scotland. His name is associated with fragments of rhymed or alliterative verse, many of which have been collected and published as "The Prophecies" (1691); and "Sir Tristram: A Metrical Romance Edited by Sir Walter Scott from the Auchinleck MSS." (1804).

Ryotwar, in India, and especially in the Madras presidency, the system of land tenure by which the ryots or cultivators of the soil are directly under government, paying so much annually according to assessment.

Rysbrach, Michael, an English sculptor; born in Antwerp, Belgium, June 24, 1693; settled in London in 1720, and executed numerous works, in particular the monument to Sir Isaac Newton in Westminster Abbey (1731), that to the Duke and Duchess of Marlborough at Blenheim, a bronze equestrian statue of William III. for Bristol (1733), a colossal statue of George II. for the parade at Greenwich Hospital (1735), a Hercules at Stourhead, a statue of Queen Anne at Blenheim, one of Locke in Christ Church, Oxford (1757), and busts of Admiral Vernon, Earl Stanhope, Kneller, Gay, Rowe, Milton, Ben Jonson, Palladio, Inigo Jones, the Dukes of Somerset, Beaufort, and Argyll, Sir Hans Sloane, Pope, Sir R. Walpole, Bolingbroke, etc. He died Jan. 8, 1770.

Ryswick (rīs'wik; properly RIJSWIJK), a village and castle situated in South Holland, not far from The Hague, where the peace of Ryswick, which terminated the war waged against Louis XIV. by a league consisting of Holland, the German empire, Britain, and Spain, was signed, Sept. 21, 1697.



S, the 19th letter and the 15th consonant of the English alphabet. It represents a hissing sound and is classed as a sibilant. "In pronouncing *s*, we touch the gum with a part of the tongue just above that part which is used in pronouncing the palatals; but so lightly, and with the tongue so broadened out that we do not stop the outward flow of the breath completely; it oozes forth with that hissing sound which, whether in the human organ or in any other machine, invariably results from the rapid flow of air through a contracted passage." There are two sounds attached to this letter in English; the one surd, or uttered with breath merely, the other sonant or voiced. The first is a mere hissing sound, as in *sin*, *so*, etc.; the other is exactly the same as that of *z*, as in *music*, *muse*, etc. *S* in some words, as *isle*, *island*, *viscount*, is silent. It is closely allied to *r*, and even in the oldest English we have traces of the interchange, as in *frore* = *froren* = *frosen* (frozen), *gecoren* = *chosen*, etc. *S* has become *st* in *hoist* = *hoise*, *whilst* = *whiles*, etc. It has been changed into *c*, as in *mice* = Old English *mys*, once = Old English *ones*, hence = Old English *hennes*, etc. With a following *h* it forms a digraph, a weakening of an older and stronger sound *sc*, as *shall* = Old English *sceal*, *fish* = Old English *fisc*, etc. It has been changed into *ge*, as in *cabbage* = French *cabus*; Latin *cabusia*; *sausage* = French *saucisse*; Latin *salsisia*. In *pick-ax*, owing to a mistaken etymology, it has become *x*. In Romance words *s* has passed into *sh*, as *radish* = Latin *radix*; *cash* = French *casse*, *chasse* = Latin *capsa*. From some words it has disappeared as in *pea* = Old English *pise* = Latin *pisum*; *hautboy* = French *hautbois*; *puny* = French *puisne*, etc. In a few words we find an intruded *s*, as in *island* = Old English *caland*, *igland*, *aisle* = French *aile*; *squeeze*, *sneeze*, *scratch*, *smell*, etc. It is represented by *z* in *dizzy* = Old English *dysig*; *freeze* = Old English *freosan*. In Old English *sc* and *sp* were frequently transposed to *cs* and *ps*, as in *ask* = Old English *axian*, *clasped* = *clapsed*. **S** is an exceedingly common letter in En-

glish. It is the characteristic sign of the genitive case and plurals of names.

S as an initial is used for *South* as in *S. W.* = *Southwest*; for *society*, as *F. R. S.* = *Fellow of the Royal Society*; for *Saint*, or double (*SS.*) for *Saints*. *S* as a symbol is used as a numeral for 7, and with a dash over it, for 7,000. Also in chemistry for the element sulphur.

Saadi. See **SADI**.

Saale, a river of Germany; distinguished from smaller rivers of the same name as the Saxon or Thuringian *Saale*, rises on the W. slope of the *Fichtelgebirge* (Bavaria), and flowing N. through several minor States, finally across Prussian Saxony, past the towns of *Hof*, *Rudolstadt*, *Jena*, *Naumburg*, *Weissenfels*, *Merseburg*, and *Halle*, falls into the *Elbe*, about 18 miles above *Magdeburg*.

Saar, Ferdinand von (sar), an Austrian poet; born in *Vienna* Sept. 30, 1833. Among his works are the tragedies "*Hildebrand*" (1865) and "*The Death of Henry*" (1867)—these being united under the title "*The Emperor Henry IV.*" (1872); "*Tales from Austria*" (1877); "*Vienna Elegies*"; "*Poems*" (1882); "*Three New Novels*" (1883); "*The Two De Witts*"; "*Thassilo*" (1886); "*The Castle of Kost-enitz*" (1893). He died in *August*, 1906.

Saarbruck, or Saarbrucken, a town of Rhenish Prussia; on the *Saar*; 40 miles S. E. of *Treves*; the center of a large coalfield, and of iron and glass works, with manufactures of tobacco, chemicals, metal utensils, etc. Here, on Aug. 2, 1870, the first engagement took place between the French and Germans, the latter retreating. Pop. (1900) 23,242.

Saardam. See **ZAANDAM**.

Saarlouis, a fortified town of Rhenish Prussia; 31 miles S. of *Treves*; on the left bank of the *Saar*. Fortified (1681-1685) by *Vauban*, it was in the possession of France till 1815, when the Congress of *Vienna* gave it to Prussia. Here Marshal *Ney* was born.

Saavedra, Angel de, Duque de Rivas (sä-vā'drä), a Spanish statesman and poet; born in *Cordova*, March 10, 1791. He was the author of "*Poetical Essays*" (2 vols. 1813); "*Florinda*" (1824-1825), an epic on the Moorish conquest of Spain; "*The*

Moorish Foundling" (1834), a national epic; many dramas; a life of Masaniello (1860); and a history of the Neapolitan revolution (2 vols. 1848; new ed. 1881). He died in Madrid, June 22, 1865.

Saavedra y Faxardo, Diego de (sä-vā'-drä ē fä-här'dō), a Spanish moralist; born in Algezares in Murcia, 1584. His most notable work is "The Type of a Christian Prince" (1640), written for the instruction of the son of Philip IV., who died before attaining his majority. He wrote also the poem "The Republic of Letters" (1670); a dialogue between Mercury and Lucian on the follies of European statesmen (first printed 1787); and "The Gothic, Castilian, and Austrian Crown" (reprinted 1887). He died in Madrid, Aug. 24, 1648.

Saba, a small island in the Leeward group of the West Indies, a little N. of St. Kitt's and near the island of St. Eustatia; marked on the few maps that show it "Dutch." Neither contemporary geography nor literature throw any more light on its singular and interesting history and institutions. But it is in reality no more a Dutch colony than Andorra is a Spanish province, and, though it does fly the flag of Holland on Sundays and holidays, the design is modified by the patriotic addition of a green cabbage in the upper left corner—executed with very indifferent art. For the Island of Saba, W. I., is an independent republic, albeit it is but a dozen miles in circumference, and its population numbers something less than 2,000 souls. But what the isle lacks in longitudinal extent it amply makes up for in altitude, soaring, as it does, up into the very clouds to a maximum height of nearly 3,000 feet. And what its people lack in numbers they make up for in independence of spirit only comparable to that of the Swiss and Scotch.

The island rises with startling abruptness from the encircling sea, its general aspect leaving no palpable sign of its being inhabited. Indeed, the entire 12 miles of its coast is so sheer in its rise from the waves, rising to a considerable and almost uniform height of from 800 to 1,200 feet before being broken by crag or slope, that no one would conceive it accessible to any foot but that of the sea-bird. But on the S. side there is a practicable break in the cliffs which gives access to a somewhat less sheer or utterly perpendicular face, along which a series of giddy stairs have been cut in the rock.

This is the port of Saba. The road, aptly called the "ladder," consisting of nearly 1,000 steps of irregular height and breadth, and necessarily narrow, leads to a steeply sloping shelf, or gallery, that in its turn leads between perpendicular walls through the heart of the mountain to its

summit. From this elevation, when one gets somewhat accustomed to the thin atmosphere and the giddy situation, a magnificent view is had of the surrounding islands—St. Eustatia, St. Martin, Anegada, St. Barts, Anguilla, St. Kitt's, and Nevis, and, away to the W. the blue caps of Virgin Gorda's soaring peaks.

On account of intermarriages the population is practically one vast family. Certainly they are "neighbors" in a sense not familiar to the world at large, for they live in a state of ideal communism. They are an agricultural and piscatorial folk, and, incredible as it may seem, are famous boat builders. They have a shipyard on the summit where they construct boats, and even sloops and schooners of considerable size, some as large as 40 or 50 tons. These they slide down the sheer face of the S. cliffs, or lower by means of primitive but immense and effective derricks and tackling, and then tow them into the little cove where they are fitted out for sea. In these vessels they make voyages throughout the West Indies, trafficking in their island produce. Indeed, till the great American fruit companies and steam transit shut them out, they even competed with the Bahama traders for the New York fruit and vegetable market.

The principal products are cotton, which is manufactured on the island into slippers, hammocks, and other articles; and all tropical fruits and vegetables, especially cabbages, which are regarded as par excellence the national staple. The cabbage is the coat of arms of the republic, and finds a place in its flag, as already mentioned. Every inch of the valley not occupied by habitations is well cultivated, making a lovely garden, the cultivation rising along the slopes of the mountain till the bare rock of the encircling crests is met. There are no streams or even springs; but the rainy seasons are regular and the moisture is perpetual at that altitude. Moreover, nature, aided partly by art, has made a peculiar arrangement for the water supply.

The Sabans are all pure-blooded white people, without a stain of "color." They are the descendants of a number of Dutch, Swedish, and Danish pirates of the 17th and early 18th centuries, who, discovering the little island and being at once impressed with its matchless possibilities as a stronghold, settled their families on it and fortified its naturally inaccessible heights. In the course of time piracy fell off in that locality, and the island was abandoned by its masters. But the families remained, and they increased and multiplied in their aerial valley almost forgotten by the world that then made the West Indies the arena of naval warfare. Thus the Sabans grew up through a few generations of independence and had

forgotten to owe allegiance to State or sovereign.

Early in the 19th century they were to all intents and purposes "discovered" by the Europeans in the neighboring colonies. They declined to be claimed and governed by strangers, however, and the problem arose how to subdue them. English, French, Swedish, Dutch, and Danish warships vainly strove to dislodge the islanders and plant their several flags, but the Sabans stood them off. Eventually the islanders surrendered to the Dutch governor of the nearest colony, St. Martin, on conditions set forth by themselves. These conditions were that in consideration of Dutch protection they would fly the flag of Holland with the addition of a cabbage to distinguish their independence. They were to be exempted from all taxes and to appoint their own governor and pay him themselves. In fact, the island's affairs were to go on just as formerly. To this treaty the home government consented.

The affairs of the island are conducted by a governor, who is appointed for life, assisted by a council of seven. Very like Andorra, Saba has no written laws, and there is little litigation and less crime to call for them. Possible disputes are settled by the governor according to his judgment and conscience. Criminal charges could, without any doubt, be laid in the courts of St. Martin legally, but it is a doubt that the event has never settled whether the "free and independent" republic would recognize jurisdiction, and, if not, one may well wonder how it could be enforced. As said, no taxes are paid by the Sabans except their voluntary contributions in labor or in kind to maintain their own modest municipality. Andorra pays a customs tribute to France, and another to Spain, of 969 francs annually on its imports; but Saba pays nothing to Holland, if we except register licenses for the shipping and the price that is charged when a new flag is to be got.

The Sabans are known throughout the West Indies for their exceedingly fair and, indeed, ruddy complexions, blue eyes, and flaxen hair. All seem to be cast in the same mold, which is no doubt accountable by the incessant intermarriages above mentioned. Yet, like all mountaineer tribes, they are a hardy and stalwart race, which characteristic is not modified by their marine habits. Mentally they are not of a very high type, being exceedingly simple in thought as in manners. Their religion is Lutheran, and though they have no resident minister their spiritual welfare is well looked after by the clergy of St. Martin.

Altogether a more extraordinary, and in many senses model, commonwealth does not exist on the face of the earth. That these people, the direct descendants of the dread pirates of the Caribbean without admixture,

should today make the nearest approach to Edenic simplicity and purity extant is one of the semi-cynical lessons of history that civilization may well pause to ponder.

Sabadilla, Cebadilla, or Cevadilla, the name given in commerce to the pulverized seeds of two plants, the *Asagraea officinalis* of Lindley, and the *Veratrum Sabadilla*, both belonging to the natural order *Melanthaceæ*. Mexico now supplies the bulk of the sabadilla seeds employed in pharmacy. The seeds of both plants are long, triangular, blackish-brown outside, white inside, of an acrid and burning taste, but without smell. Sabadilla powder is used as a vermifuge. The alkaloid extracted from the seeds, and known as veratrine, is applied externally in cases of neuralgia, rheumatism, gout, dropsy, and also as an insecticide. Large doses of veratrine act as a most irritant and energetic poison, while small doses prove a rapid cathartic and diuretic.

Sabæans, the name of the ancient inhabitants of Yemen in Southern Arabia. They are the people called Sheba in Gen. x: 28, xxv: 3; Job vi: 19; and other passages in the prophets; and it was probably the sovereign of this people who paid the celebrated visit to Solomon. The Sabæans were a powerful and wealthy people, who from long before the days of Solomon down to the beginning of the Christian era controlled the sea and caravan traffic in gold, sweet spices, ivory, ebony, and valuable tissues that came from India and Africa and were dispatched N. to Syria. To protect and watch over this trade they had stations or colonies in Northern Arabia and in Ethiopia. The capital of their country was Mariaba (Marib), the ruins of which, including vast dams, lie N. E. of Sanaa. Their religion included the worship of the sun and moon and a number of other deities. Their language is intermediate between Arabic and Ethiopian, but nearer akin to the former. In the 8th century B. C. the people of Saba paid tribute to the kings of Assyria (Tiglath-Pileser and Sargon). The Roman governor of Egypt in 24 B. C., tempted by the fame of the great wealth of the Sabæans, sent an expedition under command of Ælius Gallus to invade their country; but it met with little success. Not long after this event, however, the trade on which the Sabæans relied began to take a sea route and go up the Red Sea, and from that cause their prosperity and power seem to have declined.

Sabal, the genus to which the palmetto belongs.

Sabaoth, Lord God of, a Scripture appellation of the Deity, meaning Lord God of Hosts. Contrary to a common error, it has no connection with the word Sabbath.

Sabatrine, $C_{51}H_{86}N_2O_{17}$; an alkaloid discovered by Weigelin in sabadilla seeds. It forms an uncrystallizable resin-like mass, slightly soluble in water, soluble in alcohol, ether, chloroform, and benzol, and neutralizes acids forming salts.

Sabbatai Zevi, **Sabbathais Zevi**, or **Sabtai Zefi**, a false messiah, the founder of a widespread sect of semi-Christians and semi-Jews throughout Europe, Asia, and Africa; born in Smyrna, Turkey, in 1641. He led thousands of followers, mainly in Smyrna, Salonica, Alexandria, and Jerusalem, to believe in him as the Messiah (see MAHDI). In 1664 about 80,000 people belonged to the new empire; and in the following year the approach of the Messianic reign and of the rebuilding of the Temple were proclaimed aloud in the streets of Alexandria by Sabbatai and six disciples. Somewhat later he returned to Jerusalem; and the general resurrection, to take place within six years, and the deposition of the Sultan, whose crown would be placed on Sabbatai's head, were proclaimed far and near. But three years later he was apprehended at Smyrna and terrified into something like a recantation of his mission. He was said to have declared that his sole object had been all along to embrace Islam and to carry over all the Jews with him. The Sultan declared himself satisfied, and honored him with the title of an effendi, giving him an honorary post at the same time. But the movement was far from having reached its end. A fictitious man was supposed by some to have embraced Islam, while the real Messiah had ascended heavenward. Finally the grand vizier was persuaded to imprison Sabbatai once more, and to send him to Albania or Servia, where he died in prison—according to some, in consequence of poison, while according to others he was executed in 1677, 10 years after his conversion.

Sabbatarian, in the 16th century, a sect who considered that the Christian Sabbath should be kept on the seventh day (Saturday). (See SEVENTH-DAY BAPTISTS.) In modern times the word means one who holds that the Lord's day is to be observed among the Christians in exactly the same manner as the Jews were enjoined to keep the Sabbath; one who holds rigid views of Sabbath observance.

Sabbatarian Controversy, a controversy regarding the manner in which Sunday should be kept, arising out of the publication of King James' "Book of Sports," published in 1618. The dispute was between the High Churchmen, who were generally in favor of the king's views, and the Puritans, who very strongly opposed them. Though the controversy has altered its form, and access to museums, libraries, and picture galleries is now contended for, it has not yet reached its end.

Sabbath, a sacred day of rest (the word being derived from *shabath*, Hebrew, to rest), the institution of which is first mentioned in Gen. ii: 2-3:

"And on the seventh day God finished his work which he had made; and he rested on the seventh day from all his work which he had made. And God blessed the seventh day and hallowed it; because that in it he rested from all his work which God had created and made."—"Revised Version."

The prevailing interpretation of these verses is that the Sabbath was instituted at the creation for mankind in general, and that septenary institutions may therefore be expected in all nations. Prior to the giving of the law from Mount Sinai, the Sabbath is mentioned in connection with the descent of manna (Exod. xvi: 5, 22-30). The keeping holy of the Sabbath is enjoined in the fourth commandment in Exodus, because of God's having rested after the creation (Exod. xx: 8-11); in Deuteronomy because of the deliverance of the Hebrew bondsmen from Egypt (Deut. v: 12-15). Two lambs instead of one were offered when it came (Num. xxviii: 3-4, 9). Isaiah (lvi: 2, lviii: 13) strongly advocated its observance.

Always in the Gospels, and as a rule in the other books, Sabbath means the seventh day of the week. By this time its observance had become very rigid and punctilious, and Jesus Himself was constantly denounced by the Pharisees and others as a Sabbath-breaker (Matt. xii: 1-2; Mark ii: 2-3). In self-defense he laid down this principle: "The Sabbath was made for man, and not man for the Sabbath; therefore the Son of Man is Lord also of the Sabbath" (Matt. xii: 8, with Mark ii: 28). In the epistles, the keeping of the Jewish Sabbath is left optional with Christians (Col. ii: 16-17); the day for them to observe is the Lord's day (Rev. i: 10).

For the first three centuries of Church history, the Christian fathers in general drew a distinction between the Sabbath and the Sunday or Lord's day, regarding the former as Jewish and obsolete, and the latter as a divinely instituted day, joyous in its character as commemorating Christ's resurrection. But from the days of the first and ambiguous edict of Constantine on the subject:

"Let all judges, inhabitants of the cities, and artificers, rest on the venerable Sunday [dies solis]. But husbandmen may freely and at their pleasure apply to the business of agriculture,"

there was an increasing tendency to transfer to the Sunday, and, in a less degree, to saints' days and minor festivals the restrictions of the Jewish Sabbath (see SABBATH BREAKING). The third Council of Orleans (A. D. 538) strove to check this tendency, but in the same century we find legends of miraculous judgments on those who worked on the Sun-

day. The idea of the "Christian Sabbath" seems to be enunciated for the first time in Alcuin. Smith says "that the general teaching of the schoolmen follows the express declaration of Aquinas, 'that the observance of the Lord's Day in the New Law supersedes the observance of the Sabbath, not by obligation of the (divine) law, but by the ordinance of the Church and the custom of the Christian people.'" The Reformers generally were opposed to Sabbatarian views, which, however, more or less modified, found a place in Protestant churches generally, and reached their height in the Puritan period. See SABBATARIAN CONTROVERSY.

In the Middle Ages Sabbath meant only Saturday. According to the elder Disraeli, it was first used in England for Sunday in 1554.

Sabbath Breaking, the act of breaking, profaning, or violating the Sabbath. In Jewish times Moses, by the divine command, punished with death a man who gathered sticks on the Sabbath (Num. xv: 32-36). Nehemiah put an end to secular work among the Jews and the heathen Tyrians who came to traffic at Jerusalem (Neh. xiii: 15-22).

In Christian times the edict of Constantine carried with it penalties on those who disregarded it. Legislation in favor of the Sabbath naturally followed in most Christian countries. In the United States, legislation concerning the observance of Sunday varies according to the views prevailing in the different States. In one feature, however, all are agreed, viz., that no religious act in honor of the day shall be enforced by law. In all matters under its control it is the practice of the Federal government to require the keeping of the Sunday as a day of rest from unnecessary labor and business. In England, statutes on the subject were passed under Athelstan, Henry VI., Charles I., etc. By the statute of Charles II., still in force.

"No person is allowed to work on the Lord's day, or use any boat or barge, or expose any goods to sale, except meat in public houses, milk at certain hours, and works of necessity or charity, on forfeiture of 5s. Nor shall any drover, carrier, or the like travel on that day, under pain of 20s."

Another act of George III., passed in 1781, chiefly at the instance of Beilby Porteus, Bishop first of Chester, then of London, was primarily directed against Sunday promenades for which money was taken, and meetings for discussing points of Scripture. It is put in force when Sunday evening meetings of a kind objected to by Sabbatarians are attempted.

Sabbath Day's Journey, in Judaism, a very short journey, so as not to interfere with the rest of the Sabbath. The Mosaic law does not precisely define it. Practically it was fixed at 2,000 yards, because the

fields of the suburbs for the pasture of the Levites' flocks and herbs measured 2,000 yards across. See Acts i: 12.

Sabbatical Year, in Judaism, the name given to every seventh year, during which the Hebrews were not to sow their fields or prune their vineyards (Exod. xxiii: 10, 11; Lev. xxv. 2-7; Deut. xv. 1-11; xxxi: 10-13).

Sabella, in zoölogy, the typical genus of the sub-family *Sabellinæ*. Mouth transverse across gills; gills two, feathery; funnel comb-shaped, spiral, and large. Stopper cylindrical. Front tubercles with hooks and bristles. Tube gelatinous, covered with sand.

Sabellianism, in Church history, the name given to any form of doctrine which denies a real distinction between the Persons of the Trinity; the same as Patripassianism. Also the doctrine of the adherents of Sabellius (an African presbyter of the 3rd century), if not of Sabellius himself. It resolved the doctrine of the Trinity into three manifestations of God to man, and taught that the same Person was the Holy Ghost when manifesting himself to the Christian Church, and, by parity of reasoning, the Son, when he appeared in Christ. Thus Patripassianism was avoided, but the Incarnation, as well as the Trinity, was denied, for the manifestation of God in Christ could differ only in degree, not in kind, from his union with other holy men. Akin to this teaching was that of Marcellus (Bishop of Ancyra in the early part of the 4th century), who made the Logos a mere attribute of God, manifesting itself in the creation, the Incarnation, and the sanctification of Christians.

Saber, or **Sabre**, a sword having a curved blade, specially adapted for cutting. That for heavy cavalry has a slightly curved, heavy blade. The light cavalry saber has a lighter blade, somewhat more curved. The horse-artillery saber is still shorter, lighter, and more curved, and has but one branch to the guard.

Saber Tache, a leathern case or pocket worn by cavalry officers at the left side, suspended from their sword belt. It is rather ornamental than useful, and its face bears the regimental emblems, number, etc.

Sabiaceæ, in botany, a small order of hypogynous exogens, alliance Rutales. Climbing plants, with alternate exstipulate leaves; flowers few, in short axillary panicles; sepals five, small persistent, with colored dots; petals five, with rows of red glandular dots, persistent; stamens, equal in number to the petals, and opposite to them; filaments, short; drupes, two, rounded, sub-reniform; seed solitary.

Sabianism, Sabæanism, or Tsabaism, a faith which recognized the unity of God, but worshiped angels or intelligences supposed to reside in the stars and guide their motions, whence the lapse, at least on the part of the common people, to the worship of the stars became easy. They had sacrifices and sacred days, and believed in a future state of retribution. They were once numerous in Arabia, Syria, and Mesopotamia, and their sacred books were in Syriac. The early Mohammedans did not rank them with polytheists.

Sabians. See MANDÆANS.

Sabicu, or Savicu, a leguminous tree, *Lysiloma Sabicu*, native of Cuba. It furnishes an exceedingly heavy and hard wood, with a texture as smooth, close, and firm as ivory almost, and of a rich, warm, red color. It is much employed for ship-building and cabinet making.

Sabin, Joseph, an American bibliophile; born in Bramston, England, in 1821. His store on Nassau street, New York, was noted for rare books. He was famous for his knowledge of books and his reprints of old and curious works. He edited the "American Bibliographist"; and published a "Dictionary of Books Relating to America" and a "Bibliography of Bibliographies." He died in Brooklyn, N. Y., in 1881.

Sabin, Lorenzo, an American historian; born in New Lisbon, N. H., Feb. 28, 1803; was a member of the New Hampshire Legislature for three successive terms and for a time deputy collector of customs; settled in Massachusetts in 1849, and was made a secret agent of the United States Treasury Department in connection with United States commerce as affected by the Ashburton Treaty; and was a Whig member of Congress in 1852-1853. His publications include "The American Loyalists, or Biographical Sketches of Adherents to the British Crown in the War of the Revolution" (1847); "Reports on the Principal Fisheries of the American Seas" (1853); "Notes on Duels and Duelling, with a Preliminary Historical Essay" (1856); "Hundredth Anniversary of the Death of Major-General James Wolfe" (an address, 1859); etc. He died in Boston, Mass., April 14, 1877.

Sabine, a river of the United States, forming the boundary between Louisiana and Texas. It rises in Northeastern Texas, and after a course of some 500 miles flows into the Gulf of Mexico through Sabine Bay. It is too shallow to be of much use for navigation.

Sabine, Sir Edward (sab'in), a British physicist; born in Dublin, Ireland, Oct. 14, 1788. He obtained a commission in the artillery in his 16th year, and accompanied

Ross and Parry as astronomer in the expeditions of 1819-1820 in search of a Northwest passage. Between 1821 and 1827 he undertook a series of voyages to places between the equator and the North Pole, making at each point pendulum and magnetic experiments of great value. Elected a Fellow of the Royal Society in 1818, he was from 1861 to 1879 its president. He was for many years secretary of the British Association, and filled the office of president in 1853. In 1856 he was promoted Major-General, in 1869 he was created K. C. B., retiring as general in 1874; and in 1875 he was elected a corresponding member of the French Academy. His scientific reputation rests chiefly on his labors in terrestrial magnetism, his various memoirs in the "Philosophical Transactions" and "Reports" to the British Association being to this day invaluable collections of magnetic facts. By his personal influence he did more than any other single man in inducing the government to establish magnetic observatories in different parts of the world, and in initiating the valuable magnetic work now carried out by the admiralty. He died in Richmond, England, June 26, 1883.

Sabine Cross-Roads, a place in De Soto parish, La., about 4 miles S. of Mansfield, where, in the Civil War, the Confederate troops under command of Generals E. Kirby Smith, Taylor, Mouton, and Green, defeated the Federal troops under command of Generals Lee, Franklin, Banks, and Ransom. The Union forces lost 10 guns and about 7,000 of their men were taken prisoners.

Sabine Lake, a body of water formed by an expansion of the Sabine river, on the boundary of Louisiana and Texas, about 5 miles N. of the Gulf of Mexico. It is about 18 miles long, averages about 9 miles in breadth, and has an area of about 150 square miles.

Sabine Mountains, a range that is a branch of the Apennines, near the border of ancient Latium, E. of Rome. Its highest point is about 4,200 feet.

Sabines (sā'bīnz), an ancient people of Italy, supposed to have been named from "Sabus," one of their deities. Little is known of their history. They were at war with the Romans at a very early period. A contest broke out between them 504 B. C., and a body of the Sabines migrated to Rome, where they were welcomed, and founded the powerful family and tribe of Claudii. The Sabines carried their ravages to the very gates of Rome, 469 B. C. On their defeat by Marcus Horatius, 449 B. C., their camp was found full of plunder obtained in the Roman territories. They were again at war with the Romans, 290 B. C., and having been vanquished, many of

them were sold as slaves. The remaining citizens were admitted to the Roman franchise.

Sable, the *Mustela zibellina*, a digitigrade carnivorous mammal, nearly allied to the common marten and pine marten, found chiefly in Siberia and Kamchatka, and hunted for its fur. Its length, exclusive of the tail, is about 18 inches. Its fur, which is extremely lustrous, and hence of the very highest value, is generally brown, grayish-yellow on the throat, and with small grayish-yellow spots scattered on the sides of the neck. It is densest during winter, and owing to the mode of attachment of the hairs to the skin it may be pressed or smoothed in any direction. Two other species of sable are enumerated, the Japanese sable (*M. melanopus*) and a North American species (*M. leucopus*). The Tartar sable (*M. siberica*) is the name given to a species of the weasel genus found in Northern



THE SABLE.

Russia and Siberia, and the pekan (*M. canadensis* or *M. pennantii*) of North America is sometimes known as the Hudson Bay sable. The skins of all these varieties are frequently dyed and otherwise manipulated to imitate the true Russian sable. Sable hair is also used in the manufacture of artists' pencils. Sable fur has been of great value from very early times.

Sable, in heraldry, black, one of the tinctures used in blazonry. In engraving it is expressed by perpendicular crossed by horizontal lines.

Sable Island, a low-lying island in the Atlantic; in lat. 44° N. and lon. 60° W.; 110 miles E. of the central part of Nova Scotia (and not near Cape Sable, at the S. E. corner of Nova Scotia, where there is also a Sable Island). It consists of two parallel sand ridges, with a lagoon between them. Scrubby grass, cranberries, etc., grow on the island, which is so dangerous to navigation, and has so frequently been the scene of wrecks, as to be called "the sailor's grave." The Canadian government maintains two lighthouses here. The island is gradually sinking. Early in the 19th century it was

40 miles long; in 1890 it was reduced to 20 miles. Near it there are sandbanks.

Sables D'Olonne, Les, a seaport of France; department of Vendée; on the Atlantic coast, 50 miles S. by W. of Nantes. It owes its early importance to Louis XI., who excavated (1472) the port and erected the fortifications. There is a trade in grain, wine, salt, cattle, timber, and tar. Salt making, shipbuilding, and fishing (sardines and oysters) are the chief occupations. The town is visited for its sea-bathing. Pop. (1901) 11,870.

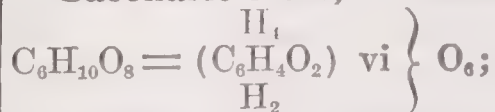
Sabot (sab'ô), a wooden shoe made of one piece hollowed out by boring tools and scrapers. The kinds of woods used are willow, poplar (Lombardy), beech, birch, aspen, ash, hornbeam, walnut. Sabots are worn by the peasants of France, Belgium, etc. In ordnance, a circular block, usually of wood, hollowed out and fixed by tin straps to a (smooth-bore) projectile, so as to maintain its proper position in the bore of a gun, to prevent its upsetting in loading, wobbling in discharging, and to decrease windage by occupying the bore more perfectly than can be done by the projectile itself. Also a gas-ring.

Sabotiere, a French apparatus for making ices. It consists of an outer pail of wood and an inner vessel of metal, to contain the cream to be iced. In the intervening space is a mixture of pounded ice and salt, or of sulphate of soda and hydrochloric acid. The contents of the inner vessel are agitated by a handle, and the frozen cream is occasionally scraped down.

Sabrina Land, a stretch of coast land discovered in the Antarctic Ocean (1839) by Balleny; is crossed by lon. 120° E., and the Antarctic Circle. Sabrina is the Latin form of Severn.

Sacbut, or **Sackbut**, a musical instrument of the trumpet kind with a slide; in fact an old variety of TROMBONE (*q. v.*). The instrument called *sabbeka* in the Hebrew Scriptures has been erroneously rendered as sacbut by the translators. The exact form of the sabeka has been much disputed, but that it was a stringed instrument is certain, for the name passed over into Greek and Latin in the forms *sambuke*, *sambuca*, a harp-like instrument of four or more strings.

Saccharic Acid, in chemistry,



a dibasic acid discovered by Scheele, and produced by the action of nitric acid on cane sugar, glucose, milk sugar, mannite, etc., aided by heat. It is deliquescent, uncrystallizable, soluble in water and alcohol, insoluble in ether, and turns brown even at the heat of the water

Saccharide

bath. The saccharates are crystalline, nearly insoluble in cold water, but soluble in boiling water. Saccharate of silver, $C_6H_5Ag_2O_8$, obtained by mixing the neutral potassium salt with nitrate of silver, is a white crystalline powder very soluble in ammonia, the solution depositing metallic silver when boiled.

Saccharide, in the plural, Berthelot's name for a series of compounds formed by heating dextro-glucose and other kinds of sugar with organic acids. They are divided into four classes: glucosides, or those produced from dextro-glucose; levulosides, from lævoglucose; galactosides, from milk sugar; and inosides, from inosite. The saccharides are soluble in water, and intensely bitter when they contain a volatile acid; insoluble when they contain a fixed acid.

Saccharimeter, a form of polariscope devised by Mitscherlich with special reference to testing sugars by polarized light. It is provided with a graduated circle for measuring the angles of polarization which serve as a basis of comparison for the different qualities. The form now in use is provided with a scale showing the percentage of sugar contained in the solution under examination.

Saccharin, in chemistry,



a sweet substance which was discovered by Fahlberg and Remsen in 1879, and named by them anhydro-orthosulphamine-benzoic acid. It may be prepared by oxidizing orthotoluene with potassium permanganate. It forms white crystals, soluble in hot water, alcohol, and ether, and melts at 220° with partial decomposition. Its sweetness exceeds that of cane sugar about 280 times, one part in 10,000 of water being distinctly perceptible. When taken into the system it passes through unchanged. It is used to disguise the taste of medicines and for sweetening tea, coffee, etc., and in cases of diabetes where sugar is prohibited. It is manufactured in Saxony and the United States and is very costly.

Saccharum, sugar cane; a genus of grasses, tribe Andropogoneæ; inflorescence in loose panicles, with lanceolate spikelets; glumes two-valved, two flowered, enveloped in long wool; lower neuter with one pale, upper hermaphrodite with two; mostly tropical or sub-tropical; known species about 62. *S. officinarum* is the common sugarcane. Other Indian species — *S. fuscum*, *S. mara*, *S. munja*, *S. semidecumbens*, *S. canaliculatum*, and *S. spontaneum* — have fibers used in the manufacture of ropes, strings, mats, and paper. The leaves and seeds are employed for thatch, and the culms of some for native pens.

Saccostomus

In chemistry, a term formerly synonymous with sugar, but now used almost exclusively to denote an invert sugar prepared from cane sugar by the action of acids. It is largely used by brewers.

Sacchetti, Franco (sä-ket'ē), an Italian poet; born in Florence about 1330. His most important work is the "Three Hundred Stories" — of which only 223 remain, and some of these are mutilated; they give a faithful picture of life in those days, with many satirical allusions. Among his poems the best are the ballads and the madrigals. He died about 1400.

Saccomyidæ, in zoölogy, the pouched gopher family, comprising rodents which have large and distinct external cheek pouches, pelage composed of stiff hairs with no under fur, and the upper lips not cleft. The pouched gopher, pocket gopher, or pouched rat (*Geomys bursarius*), of the Northwestern States, is 8 to 10 inches long to the tail, which is one to two inches; the color reddish-brown above, paler beneath, with a plumbeous tinge along the vertebral region. Its cheek pouches are very large, extending as far back as the shoulders, and lined with short hair; and, as in other members of this family, are used mainly or wholly to convey food into the burrows, to be stored up or eaten at leisure.

Saccopharynx, a genus of *Murænidæ*, with a single species, *S. flagellum*, a deep-sea conger eel, of which only three specimens have been observed: muscular system very feebly developed; bones thin and soft, wanting in organic matter; head and gape enormous; stomach distensible in an extraordinary degree; vent at end of trunk. The specimens known have been found floating on the surface of the North Atlantic with their stomachs much distended, having swallowed some other fish many times their own weight. They attain a length of several feet.

Saccopteryx, in zoölogy, a genus of *Emballonuridæ*, group *Emballonuræ*, from the Neotropical region. Allied to the typical genus (*Emballonura*); but in the males there is an alar glandular sac, the lining membrane of which secretes an unctuous reddish substance, with a strong ammoniacal odor, which is probably of use in attracting the females (in whom the sac is rudimentary or absent). There are six species, divided by Peters into four sub-genera, according to the position of the wing sac: *S. leptura* and *S. bilineata* = saccopteryx proper; *S. canina* and *S. leucoptera* = peropteryx; *S. plicata* = balantiopteryx; and *S. calcarata* = centronycteris.

Saccostomus, in zoölogy, a genus of *Muridæ*, sub-family *Cricetinaæ*, differing from the typical genus in having the tubercles of the molar teeth arranged in threes.

There are two species, *S. lapidarius* and *S. fuscus*, from Mozambique.

Sacher=Masoch, Leopold Ritter von (sä'h'er-mäs'oh), an Austrian novelist; born in Lemberg, Austrian Poland, Jan. 27, 1835. Among his works are: "Love" (1870); "False Hermelin," stories of theatrical life (1873); "Love Stories from Divers Centuries" (1874); "The Ideals of our Time" (1876); "Property" (1877); "The New Job" (1878); "The Serpent in Paradise" (1890); "The Solitaries" (1891); "Merry Tales from the East" (1893); "The Filled and the Hungry" (1894). His wife, Aurora von Rümelin, born in Gratz, 1846, wrote: "Romance of a Virtuous Woman" (1873); "The True Hermelin" (1879); "Ladies in Furs" (1881). He died in Lindheim, Hesse, March 9, 1895.

Sacheverell (sa-shev'ur-el), **Henry**, an English clergyman; born in Marlborough, England, in 1674. While preacher at St. Saviour's, Southwark, he in 1709 delivered two bitter sermons against dissent and accused the existing Whig ministry of jeopardizing the safety of the Church. He was impeached in the House of Commons, tried in the spring of 1710, and suspended for three years. This persecution secured him at once the character of a martyr, and helped to stimulate the already fierce passions which then divided the Whig and Tory party. Sacheverell became the popular hero of the hour; while the Godolphin (Whig) ministry was overthrown. Parliament thanked him for his defense of the Church, and as soon as his suspension expired, Queen Anne presented him with the rich living of St. Andrew's, Holborn. Sacheverell, having no merit to keep him permanently before the public, now fell back into obscurity. He died in London, June 5, 1724.

Sachs, Hans, the most distinguished meistersinger of Germany in the 16th century, born in Nuremberg, Germany, Nov. 5, 1494. He learned the trade of a shoemaker and after the usual *wanderjahre*, or period of traveling from place to place, commenced business in his native city, married (1519), and prospered. He took lessons under one of the chief meistersingers of Nuremberg, and to while away the tedium of the cobbler's art made verses himself. In this he soon surpassed all his contemporaries. As a staunch follower of Luther, and an ardent advocate of his teachings, Sachs succeeded in imparting to his hymns a fervor which considerably aided the spread of the Reformation. A bronze statue in his memory was erected in 1874 at Nuremberg, where his house may still be seen. He died in Nuremberg, Jan. 19, 1576.

Sachs, Julius, a German botanist; born in Breslau, Prussia, Oct. 2, 1832; studied

at Prague, and began to teach botany there. After lecturing at the agricultural colleges of Tharandt in Saxony and Poppelsdorf near Bonn from 1859 to 1867, he was in the last year appointed Professor of Botany at Freiburg, but removed to Würzburg in the following year. There he carried on, in a laboratory built under his own direction, important experiments in plant physiology, especially in determining the influence of



HANS SACHS.

light and heat on plants, and in investigating the movements and other organic activities of vegetable growth. He wrote: "Course in Botany"; (4th ed. 1874; Eng. trans. 1875), and "Manual of Experimental Plant Physiology"; "History of Botany from the 16th Century to 1860"; (1875; trans. 1890), "Outlines of Plant Physiology"; (1873), and "Lectures on Plant Physiology" (trans. 1887). He died in 1897.

Sack (Spanish, *secco*; French, *sec*, "dry"), formerly a general name for the different sorts of dry wines, more especially the Spanish, which were first extensively used in England in the 16th century. Also a measure or weight, varying according to the article and country. Thus, in most European markets, a sack in dry measure is 5 bushels; of coal, 3 heaped bushels; in coal weight, 112 pounds; wool 2 weys or 13 tods, or 364 pounds (in Scotland, 24 stone of 16 pounds each or 384 pounds); grain or flour weight, 280 pounds; sacks of flour vary from 140 to 200 pounds, according to the standards of the countries from which they come. Also a term applied to the plundering of a town or city.

Sackbut. See SACBUT.

Sack Tree

Sack Tree, in botany, the *Antiaris* or *Lepurandra saccidora*; a stately forest tree, with alternate, oblong-elliptical, dentate leaves, growing on the Western Ghauts, etc. Bags are manufactured from it in the jungles near Coorg. A branch is cut corresponding to the length and diameter of the sack required. After being soaked it is beaten with clubs till the liber separates from the wood. The sack formed of the bark is turned inside out, and pulled down while the wood is being sawed off, a small piece, however, being left to form the bottom of the sack.

Sackville, Charles, 6th Earl of Dorset; born Jan. 24, 1637, and succeeded to the title in 1677. He traveled in Italy, sat in the first Parliament of Charles II., and soon became an especial favorite of the king, and notorious for his boisterous and indecorous frolics. He could not endure the tyranny of James II., and was one of the most ardent in the cause of the Prince of Orange. His later years were honored by a generous patronage of men of letters like Prior, Wycherley, and Dryden. He was himself the author of a few occasional lyrical and satirical pieces, but is only remembered for one short poem, the bright and delightful song, "To all you Ladies now on Land." He died in Bath, England, Jan. 19, 1706.

Sackville, Thomas, Lord Buckhurst and Earl of Dorset, an English statesman; born in Buckhurst, England, 1536. At Oxford and Cambridge he distinguished himself by his Latin and English poetry, and as a student of the Inner Temple he wrote, in conjunction with Thomas Norton, the tragedy of "Gorboduc," or "Ferrex and Porrex" (published in 1561), remarkable as the first example in English of regular tragedy in blank verse. The "Mirror of Magistrates," and the "Complaint of Henry, Duke of Buckingham," the introduction to an intended series of poems on the tragic lives of famous men, make one regret that he was induced to abandon literature for politics. He took a prominent and creditable part in some of the chief events of Elizabeth's reign. He was a member of the court which tried Mary Queen of Scots; he succeeded Lord Burleigh as lord high treasurer; and presided at the trial of the Earl of Essex. From 1587-1588 he suffered imprisonment at the instigation of the queen's favorite Leicester. In 1566 he had succeeded to his father's ample estate; was raised to the peerage as Baron Buckhurst shortly afterward; and James I. created him Earl of Dorset in 1604. He died in London, April 19, 1608, and was buried in Westminster Abbey.

Sackville-West, Sir Lionel Sackville, an English diplomatist; born July 19, 1827; was British minister to the United States in 1881-1888. He received his passports in

Sacramento

the latter year from President Cleveland for having written a letter during the presidential campaign in which he advised a vote for the Democratic ticket as conducing to British interests, in answer to a correspondent who represented himself to be a naturalized English citizen desiring political advice. He died Sept. 3, 1908.

Saco, a city in York co., Me.; on the Saco river, and on the Boston and Maine railroad; 4 miles from the ocean; and 14 miles W. S. W. of Portland. It is connected with Biddeford on the W. side of the river by a bridge. Here are York Institute, Thornton Academy, Dyer Library, Wardwell Home for Old Ladies, street railroads, electric lights, and National and savings banks. The city has manufactories of harness, belting, brushes, boots and shoes, lumber, cotton goods, cotton machinery, etc., and an assessed property valuation of nearly \$4,000,000. Pop. (1890) 6,075; (1900) 6,122; (1910) 6,583.

Saco, a river in the United States. It rises in New Hampshire, in the White Mountains, and runs S. E. into the Atlantic below Saco, Me. It is 160 miles long, and has falls of 72 feet at Hiram, of 42 feet at Saco, and numerous minor ones.

Saco, José Antonio, a Cuban historical writer and publicist; born in Bayamo, Cuba, May 7, 1797. He wrote: "A Parallel between Cuba and Certain English Colonies" (1838); "Suppression of the Slave Trade in Cuba" (1845); "Ideas on the Incorporation of Cuba into the United States" (1848); "The Political Situation in Cuba and Its Remedy" (1851); "History of Slavery from the Most Remote Times" (several volumes published in 1876 and years following; but the work was not completed). He died in Madrid, Sept. 26, 1879.

Sacramento, the military oath taken by every Roman soldier, pledging him to obey his commander and not to desert his standard; hence, an oath or ceremony involving an obligation.

In Protestant theology the Church of England and the Protestant Episcopal Church in the United States define a sacrament as "an outward and visible sign of an inward and spiritual grace given unto us, ordained by Christ Himself, as a means whereby we receive the same and a pledge to assure us thereof." They recognize two only as generally necessary to salvation, Baptism, and the Supper of the Lord. Article xxv. says that they were ordained by Christ not only to be badges or tokens of Christian men's profession, but also, or rather, to be sure signs of grace and God's good will toward us, by which He strengthens our faith in Him. They have a wholesome effect or operation only to those who worthily receive them; unworthy recipients purchase

to themselves damnation (I Cor. xi: 29. The Revised Version has "judgment.") The Westminster Confession of Faith teaches essentially the same doctrine. It considers sacraments to be "holy signs and seals of the covenant of grace" (ch. xxvii.). Other Protestant formulas are substantially the same.

In Roman theology, a visible sign, instituted by Christ, which confers *ex opere operato* (by the performance of the act) sanctifying grace on man. Matter, form and a minister acting with the intention of doing what the Church does are necessary to the valid administration of a sacrament. Besides sanctifying grace, sacraments confer sacramental grace—that is, they aid the suscipient in a special manner to attain the end for which each sacrament was instituted. The Council of Trent (sess. vii., can. 1) defines that the Sacraments of the New Law were instituted by our Lord, and are neither more nor fewer than seven in number: Baptism, confirmation, eucharist, penance, extreme unction, holy orders, and matrimony. The first five are necessary for all Christians, the last two are necessary only for the community. Baptism, confirmation, and order imprint a character on their subject and cannot be repeated without sacrilege. The term sacraments of the old law has been adopted to signify circumcision, the paschal lamb, the ordination of priests and Levites, etc., of the Mosaic economy. St. Augustine was of opinion that some remedy for original sin must have existed prior to the institution of circumcision, and to this the name of sacrament of nature is often given.

Sacramental, in Roman theology, a name given to rites which bear some outward resemblance to the sacraments, but which are not of divine institution. They are: the prayers of the Church, especially the Lord's prayer; holy water, blessed ashes, palms and candles, blessed bread; the general confession in the mass and office; almsgiving, and the blessing of bishops and abbots. The prayers, however, must be offered in a consecrated place, and the alms given in the name of the Church. See SACRAMENT.

Sacramentarians, a term used in several senses. (1) Ordinarily in England it means one who holds a "high" or extreme doctrine of the efficacy of the sacraments, especially of the Eucharist. (2) Technically, however, the word is used in Church history in an almost diametrically opposite sense for persons holding a "low" doctrine on the subject of the sacraments—for the party among the Reformers who separated from Luther on the doctrine of the Eucharist. Luther taught the doctrine of the real presence of the body and blood of Christ along with the bread and wine. Carl-

stadt, Capito, and Bucer were the leaders of those who called this doctrine in question. This sacramentarian party became so considerable that in the diet of Augsburg they claimed to present a special confession known in history by the name of the Tetrapolitan Confession—so called from the four cities, Strasburg, Constance, Lindau, and Memmingen. The Tetrapolitan Confession rejects the doctrine of a corporeal presence, and though it admits a spiritual presence of Christ which the devout soul can feel and enjoy, it excludes all idea of a physical presence of Christ's body. Simultaneously with this German movement yet independent of it, was that of the Swiss reformer Zwingli, whose doctrine on the Eucharist was identical with that of Carlstadt, and who himself presented a private confession of faith to the Augsburg diet in which this doctrine is embodied. The four cities named above continued for many years to adhere to this confession presented to the diet of Augsburg in their name; but eventually they accepted the so-called Confession of Augsburg, and were merged in the general body of Lutherans. On the contrary, the article of Zwingli upon the Eucharist was in substance embodied in the confession of the Helvetic Church.

Sacramento, a city, capital of the State of California, and county-seat of Sacramento co.; at the confluence of the Sacramento and American rivers, at the head of low water navigation, 96 miles N. E. of San Francisco. It is built on a broad, low plain and has strong levees as a protection against floods. It has a semi-tropical climate and vegetation is most luxuriant. The city has about 350 manufacturing establishments, employing about 5,000 persons, and the combined annual output exceeds \$11,000,000 in value. There is a large variety of industries, the most important including the manufacture of agricultural implements, carriages and wagons, pottery, woolen goods, machinery, liquors, furniture, etc. Here are also the Southern Pacific railroad shops which cover 25 acres of ground and employ about 3,000 men. The convenient location of Sacramento in the center of a rich agricultural region gives it a large trade with the interior of the State. There are a number of National and State banks, and numerous daily and weekly periodicals. The assessed property valuation is over \$30,000,000.

Public Interests.—The streets are well laid out, and mostly lighted by electricity. The State capitol, which stands in a beautiful plaza covering 30 acres, was finished in 1869 at a cost of about \$2,500,000. Within the plaza are the State printing office and the Exposition Building of the State Agricultural Society. In the latter the resources of the State are annually

Sacramento

exhibited. The other noteworthy buildings include the court house, United States government building, Croker Art Gallery, the buildings of the Foresters', Pythian, Odd Fellows' and Masonic orders, California State bank, Fort Sutter (rebuilt), the Sacramento Institute, Christian Brothers' College, California State Library, Sacramento Free Library, Mater Misericordia and Southern Pacific Railroad Hospitals, Children's Day Home, Marguerite Home, Ridge Home, and many charitable homes.

History.—Capt. John A. Sutter built a fort here in 1839, but the city was not settled till 1848, after the discovery of gold. The first house was built in 1849. Sacramento was made the State capital in 1854, and received its city charter in 1863. It has suffered severely twice from fire and twice from inundation. Pop. (1890) 26,386; (1900) 29,282; (1910) 44,696.

Sacramento, a river of the United States, in California. It rises in Lassen county, flows W. then S. and drains the central valley of California from the N. Its course is about 500 miles, 320 of which are navigable for small vessels. It discharges its waters into the Suisun Bay, on the line between Contra Costa and Solano counties.

Sacred Island, the same as Holy Island.

Sacred Fig. See PEEPUL.

Sacred Isle, the same as Holy Isle.

Sacred Heart, in the Roman Church, the physical heart of Christ, considered, not as mere flesh, but as united to the divinity. It is the object of a special devotion, founded in the latter part of the 17th century by a French nun of the Order of the Visitation, Sister Margaret Mary Alacoque (beatified in 1864), and first preached in England by Father de la Colombière, S. J., chaplain to Mary of Modena, queen of James II. The feast of the Sacred Heart is celebrated on the Friday (in England on the Sunday) after the octave of Corpus Christi.

Sacred Vestments. See VESTMENTS, SACRED.

Sacred War, a war about sacred places or about religion. Four sacred wars were waged in Greece (595–338 B. C.) chiefly for the defense of the temple of Delphi and the sacred territory surrounding it. A Mohammedan war for the faith is called a Jihad. The Crusades and the wars of the Reformation were sacred wars. The quarrel which led to the Crimean War was at first a dispute between Russia and France about sacred spots at Jerusalem. When Russia fights she uniformly gives out that it is a holy war; and after the destruction of the Turkish fleet at Sinope (Nov. 30, 1853), it was officially or semi-officially intimated that "the most pious Czar thanks the Lord

Sacrifice

of Lords for the success of the victorious Russian arms which triumphed in the sacred combat for the orthodox faith."

Sacrifice, the offering of anything to God or to any deity. Also that which is sacrificed, offered, or consecrated to God or to any deity or divinity; an immolated victim, or an offering of any kind, laid on an altar or otherwise religiously presented by way of thanksgiving, atonement, or conciliation.

Sacrifices form an important part of all early forms of religion. Tylor traces three stages in the development of the rite: (1) The gift theory, in which the deity takes and values the offering for himself. (2) The homage theory, in which the submission or gratitude of the offerer is expressed by a gift. (3) The abnegation theory, in which the worshiper deprives himself of something prized. With regard to their nature, sacrifices are divided into (1) Bloody [(a) human; (b) of the lower animals], and (2) Unbloody. The terrible custom of offering human sacrifices was very widely spread. It was known among the Greeks and the Romans; and is frequently mentioned in Scripture (Gen. xxii: 1-4, Judges xi: 29-40, II Kings iii: 27, xvii: 31, xxi: 6, xxiii: 10, II Chron. xxviii: 3, xxxiii: 6, Jer. vii: 31, 32, xiv: 5, 6, Ezek. xvi: 21, xx: 31, Mic. vi: 7). Stanley says:

"On the altars of Moab and of Phœnicia, and of the distant Canaanite settlements in Carthage and in Spain, nay even, at times, within the confines of the Chosen People itself, in the wild vow of JEPHTHAH (*q. v.*), in the sacrifice of Saul's sons at Gibeah, in the dark sacrifices of Hinnom, under the very walls of Jerusalem — this almost irrepressible tendency of the burning zeal of a primitive race found its terrible expression."

As civilization advanced, human victims were replaced by symbols, or oxen or sheep were offered in their stead. Unbloody sacrifices consisted of libations, incense, fruit, and cakes (often in the form of, and as substitutes for, real animals). It is noteworthy that though the first sacrifice mentioned in the Old Testament (Gen. iv: 3) belonged to this category, the first sacrifice accepted (Gen. iv: 4) was a bloody one.

"The custom of sacrificing human life to the gods arose undoubtedly from the belief, which under different forms has manifested itself at all times and in all nations, that the nobler the sacrifice and the dearer to its possessor, the more pleasing it would be to the gods."—Smith, "Dict. Antiq.," p. 999.

In the Old Testament sacrifices were of two kinds, bloody and unbloody. Those designed to atone for sin were of the former kind (Lev. i. vii.; Heb. ix: 22). The idea of sacrifice first appears in Gen. iv: 3-5, and viii: 20, but the English word sacrifice does not occur in the Authorized Version till xxxi: 54. The paschal lamb is called a sacrifice (Exod. xxxiv: 25; Deut.

xvi: 2). Even from patriarchal times sacrifices were limited to clean beasts and birds, and were offered on an altar (Gen. viii: 20). Many of these sacrifices were made by fire. A certain portion of the slain animal was reserved for the priest (Deut. xviii: 3). Under the law there were morning and evening sacrifices (I Kings xviii: 29; Ezra ix: 4, 5, Dan. viii: 11, 12, 13; xii: 11), besides weekly sacrifices on the Sabbath, sacrifices at new moons, annual ones, etc. Not merely were there stated sacrifices for the people at large, arrangements were at times made that private families also should possess the boon (I Sam. xx: 6, 20). Under the monarchy sacrifices were confined to the temple at Jerusalem (II Chron. vii: 12). Thanksgiving was called a sacrifice (Lev. vii: 12, 13; Psalm cvii: 22; cxvi: 17; Jonah ii: 9), so was praise (Jer. xxxiii: 11). Ultimately sacrifice, having hardened into a ceremony with little influence on moral conduct, is itself disparaged (Psalm xl: 6; Hosea vi: 6), and preference is accorded to obedience (I Sam. xv: 22), justice or righteousness (Prov. xxi: 3) and mercy (Hosea vi: 6).

In the New Testament, Abel's offering is now called a sacrifice, and its excellence is made to arise from the faith with which it was offered (Heb. xi: 4). Jesus is at once the sacrificing high priest (Heb. vii: 12) and the victim sacrificed (ix: 26). To love the Lord is declared by Jesus to be more than all sacrifice (Mark xii: 33), and thanksgiving and praise (Heb. xiii: 15) are again ranked as sacrifices.

In theology, the evangelical doctrine is that the sacrifices of the older economy were types and shadows of the atoning sacrifice made by Christ. It is held that when Jesus died, His sacrifice once for all satisfied Divine justice, and no other was requisite, or would, if offered, be accepted (Heb. ix: 12, 25-28, x: 10, 12, 14).

Sacrilege, in a general sense, the violation or profaning of sacred things; more strictly the alienating to laymen, or common purposes, what was given to religious persons and pious uses. Church robbery, or the taking things out of a holy place is sacrilege, and by the common law was punished with more severity than other thefts, but it is now put by statute on the same footing with burglary or housebreaking.

Sacristan, the same as sexton, which is a corrupted form of the same word; an officer in a church whose duty it is to take care of the church, the sacred vestments, utensils, etc.

Sacristy, the apartment in or connected with a church intended for the keeping of the sacred vestments and utensils while not in use, and in which also the clergy and

others who take part in religious ceremonies array themselves for service.

Sacrobosco, Joannes de, or John Holywood, an English mathematician of whom little is known, except that he seems to have been a native of Halifax, to have studied at Oxford, and taught at Paris as Professor of Mathematics, where he died in 1244 or 1250. He was one of the first doctors of the Middle Ages who made use of the astronomical writings of the Arabians. His treatise, "The Cosmic Sphere," a paraphrase of a portion of Ptolemy's "Almagest," enjoyed a great renown as a manual among the scholastics. First published in 1472, it passed by 1647 through 40 editions, besides translations and commentaries.

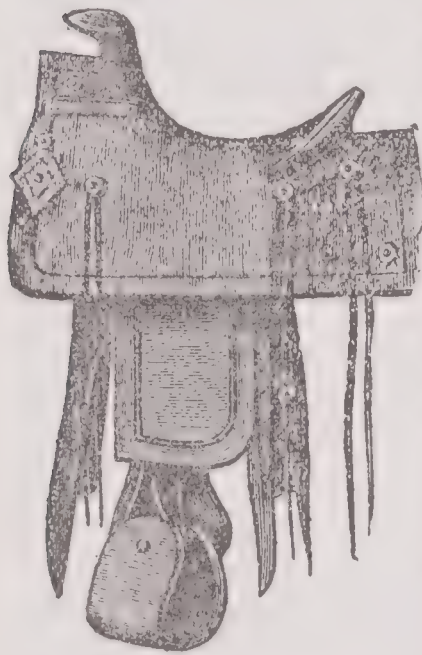
Sacrum, in anatomy, the bony structure which forms the basis or inferior extremity of the vertebral column. The human sacrum forms the back part of the pelvis, is roughly triangular in shape, consists of five united vertebræ, and from its solidity it is well adapted to serve as the keystone of the pelvic arch, being wedged in between and articulating with the haunch-bones. In most mammals the number of vertebræ forming the sacrum is smaller than in man. In birds the lowest number is about 10. Fishes possess no sacrum at all. The sacrum in man is fully ossified and completed in development from the 25th to the 30th year of life, but the component parts can generally be perceived even in the most aged individuals.

Sacy (sā-sē'), **Antoine Isaac, Baron Silvestre de**, a French philologist; born in Paris, Sept. 21, 1758. After acquiring a thorough knowledge of the Greek and Latin classics, he studied Hebrew, Syriac, Chaldee, Samaritan, Arabic, and Ethiopic; mastered the principal European languages, including Turkish, and later on also Persian; was appointed Professor of Arabic in the School of Oriental Languages in 1795, and in 1806 Professor of Persian at the College of France. In 1808 he was elected to the National Assembly. He was one of the most active members of the Asiatic Society and of the Academy of Inscriptions, and a prolific contributor to the learned Transactions of the period. Napoleon created him a baron in 1813, and under Louis Philippe he became a member of the chamber of peers in 1832. His teaching gave a powerful impetus to the study of Oriental languages in Europe. He died in Paris, Feb. 21, 1838.

Sacy, Samuel Ustazade Silvestre de, son of Baron Silvestre, a French journalist; born in Paris, Oct. 17, 1801; long one of the leading writers on the staff of the "Journal des Débats," and in 1864 appointed a member of the Council of Public Instruction. In 1855 he was elected a member of the Academy, and in 1867 of the senate. In 1858 he published a collection of his literary

articles as "Literary, Moral and Historic Selections" (2 vols.); and he edited in 1861-1864 the "Letters of Madame de Sévigné" in 11 volumes. He died Feb. 14, 1879.

Saddle, a kind of seat for a horse's back, contrived for the safety and comfort of the rider. In early ages the rider sat on the



MEXICAN SADDLE.

bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly, and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts, and the flaps, of tanned pig's-skin, and the construction and weight vary according to the pur-

poses for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle, being generally a padded structure by means of which the shafts are directly or indirectly supported.

Saddleback, a mountain in Cumberland, England, 5 miles N. E. of Keswick; height 2,847 feet.

Saddleback Mountain, a mountain in Franklin co., Me.; reaches a height of 4,000 feet.

Sadducees, one of the three Jewish sects. The current tradition, which was first published by Rabbi Nathan in the 2d century, is that the Sadducees derived their name from a certain Zadok, a disciple of Antigonus of Soko (200-170 B. C.). In the opinion of Geiger and others, the Zadok from whom they derive their name was the priest who declared in favor of Solomon when the High Priest Abiathar adhered to Adonijah (I Kings i: 32-45). His descendants had a subsequent preëminence (Ezek. xl: 46, xliii: 19, xlv: 15, xlviii: 11). Not that the Sadducees became a party so early, or that Zadok was their founder; but that some of them may have been his descendants, and all admired his fidelity to the theocratic government, even when the head of the priesthood had gone astray. It was their desire to be equally faithful. All the Jews admitted that the

Mosaic law was given at Sinai by Jehovah himself. Most of the people, with the concurrence and support of the Pharisees, believed that an oral law of Moses had similarly come from God. The Sadducees rejected this view, and would accept nothing beyond the written word. They were the Protestants of the older economy. Certain consequences followed. In the Mosaic law there is no reference to a state of rewards and punishments in a future world. When Jesus proves the resurrection from the Pentateuch, He does so by an inference, there being no direct passage which He can quote (Matt. xxii: 31, 32). The Sadducees therefore denied the resurrection from the dead (verse 23). The doctrine of a future world is taught in some passages of the Old Testament, specially in Dan. xiv: 2, 3, etc., which should have modified their belief. That it did not do so can be explained only by supposing that they attributed a higher inspiration to the Mosaic law than to other parts of the Old Testament. Epiphanius (Hæres., xiv.) and some other of the fathers assert that the Sadducees rejected all the Old Testament but the Pentateuch. Probably, however, these writers confounded the Sadducees with the Samaritans. In Acts xxiii: 8, it is stated that they say that "there is neither angel nor spirit." How they could ignore all the angelic appearances in the Pentateuch (Gen. xvi: 7, 11, xix: 1, etc.) is hard to understand. Perhaps they may have believed that, though angelic appearances once took place, they had now ceased. It is surprising that a sect with these views should, at least at one time, have almost monopolized the highest places in the priesthood; yet such was the case, at least temporarily (Acts iv: 1-6). But, with all their sacred office and worldly rank, they could have had no hold on the common people. It is probable that, when Christianity spread—even among its Jewish opponents—a belief in the resurrection, the Sadducees must have still further lost ground; but they ultimately revived, and still exist, under the name of KARAITES (*q. v.*).

Sade, Donatien Alphonse François, Marquis de, a French novelist; born in Paris, France, June 2, 1740. He fought in the Seven Years' War, and was in 1772 condemned to death at Aix for his nameless vices. He made his escape, but was afterward imprisoned at Vincennes and in the Bastille, where he wrote his fantastically scandalous romances, "Justine" (1791); "Philosophy in the Boudoir" (1793); "Juliette" (1798); and "Love's Crimes" (1800). His name has supplied to his language the useful term sadisme. Afterward he went mad, and died in Charenton, Dec. 2, 1814.

Sa de Miranda, Francisco de, a Portuguese poet who wrote in Spanish and Portuguese; born in Coimbra, Oct. 27, 1495. He traveled in Spain and Italy, and on his return home devoted himself to poetical composition, taking for his model Petrarch's lyrics. He made his first essay in hendecasyllabic verse with the "Story of Mondago" (1528); and then wrote a number of sonnets, epistles, and idyls in octaves and other Italian measures, in Spanish and Portuguese. Though he affected these Italian forms of verse, he was in feeling and sentiment entirely national. He died in Coimbra, March 15, 1558.

Sadhs, or Saadhs, a Hindu religious sect founded, A. D. 1658, by a man called Birbhan. They believe in one God, who alone is to be worshiped. They have no temples, but assemble at stated periods in houses, or courts adjoining to them. They teach a pure morality. Their numbers are few, and they are found chiefly in Furruckabad, Delhi, Mirzapore, etc.

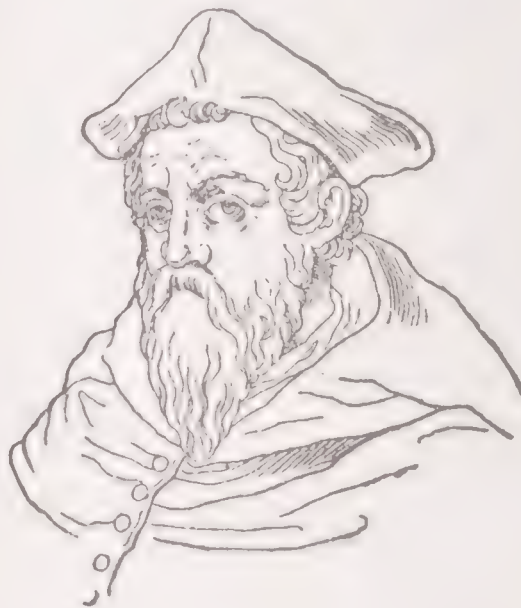
Sadi, or Saadi, the most celebrated didactic poet of Persia; born in Shiraz, Persia, about the end of the 12th century. In his youth he visited Hindustan, Syria, Palestine, Abyssinia, and made several pilgrimages to Mecca and Medina. While in Syria he was taken by the Crusaders, and actually compelled to labor as a slave at the fortifications of Tripoli. After about 50 years of wandering he returned to his native city, delighting everybody with his poems and sage precepts. The best of his works are: "Gulistan" (Garden of Roses), a moral work, comprising stories, anecdotes, and observations, and reflections in prose and verse; and "Bostān" (the Orchard), a collection of histories, fables, and moral instructions in verse. He died about the end of the 13th century.

Sadler, or Sadleir, Sir Ralph, an English statesman; born in Hackney, England, in 1507. Thomas Cromwell, Earl of Essex, in whose family he had been employed for some time, brought him under the notice of Henry VIII., and the king charged him with several important missions to Scotland, and created him a knight in 1543. As a staunch Protestant he relinquished public life during the reign of Mary, but on the accession of Elizabeth in 1558 he entered Parliament, became a privy-councillor, and the queen employed him again in Scotland. During Queen Mary's imprisonment at Tutbury Sadler was for a time her keeper, and after her execution in 1587, and just about a month before his own death, he had to perform the duty of carrying Elizabeth's letter of condolence and apology to James VI. of Scotland. He died in Standon, Herts, England, March 30, 1587.

Sadler, Anna Teresa, a Canadian author; born in Montreal, Canada, in 1856.

She wrote much for the Roman Catholic press, translated poems and tales from the French and Italian, and published: "Ethel Hamilton, and Other Tales" (1877); "The King's Page" (1877); "Seven Years and Mair" (1878); "Women of Catholicity" (1885); "The Silent Woman of Alood" (1887); and a compilation "Gems of Catholic Thought" (1882).

Sadoletto, Jacopo, an Italian prelate; born in Modena, Italy, in 1477. Sent by his father to Rome in 1502, he there found



JACOPO SADOLETO.

a patron in Olivero Caraffa (under whose roof he lived for several years), and eventually entered the Church. On the accession of Leo X. the polished Latin style of Sadoletto gained him the position of apostolical secretary, an appointment he held under two other Popes, Clement VII. and Paul III. By Leo he was also made Bishop of Carpentras in 1517, though he did not leave Rome till four years later. Settled in his charge, he performed its duties with a devotion that commanded the respect even of those who had broken with the Church of Rome. Both by Clement VII. and Paul III. he was successively summoned to Rome to give his aid in the councils of the Church. By the latter of these Popes he was in 1536 made cardinal, greatly, he affirms, against his own will, as his chief desire was the pursuit of his favorite studies and the faithful performance of the duties of his charge. In 1544 he acted as legate to Francis I. on a fruitless mission to effect peace with Charles V.

By his high character and his literary gifts and accomplishments Sadoletto ranks as one of the most distinguished churchmen of his age. While he cultivated classical studies with all the enthusiasm of the dissolute Bembo, he still preserved his Christian feeling and the sense of the responsibilities of his profession. He had sincerely at heart the reform at least of the discipline

of the Church, and had his counsels and example been followed Rome would have played a worthier part in the religious revolution of the 16th century. He corresponded with many of the Protestant leaders, and did his utmost to find a common basis on which reunion might be possible. His works mainly consist of his personal and official letters, and of commentaries on the Psalms and on the Epistles of St. Paul. On these last Erasmus passes the curious criticism "that their very polish of expression will with some take off the edge of their pious suggestion." Sadoletto's complete works were published at Rome in 1759. He died in Rome in 1547.

Sadowa. See KÖNIGGRÄTZ.

Sadtler, Samuel Philip, an American chemist; born in Pine Grove, Pa., July 18, 1847; was graduated at Pennsylvania College in 1867, and at the Lawrence Scientific School, Harvard University, in 1870; became identified with the American Chemical Society and similar organizations in London, Berlin, etc. He was a member of the committee of revision of the "United States Pharmacopœia," and edited the chemical articles in the American reprint of the "Encyclopedia Britannica," and the 15th, 16th, 17th, and 18th editions of the "United States Dispensatory." His publications include "Handbook of Chemical Experimentation for Lectures" (1877); "Handbook of Industrial Organic Chemistry" (1891); "Text-book of Pharmaceutical Chemistry" (1895); etc.

Sæmund the Learned, an Icelandic scholar of the 12th century. He traveled widely in pursuit of learning, visiting Paris and Rome, and afterward was a priest at Oddi. He was unknown to scholars till about 1643, when the then newly discovered "Elder Edda" was ascribed to him by Brynjulf Sveinsson, though the poems of that collection date in all probability back to the 8th or to the 9th century. Sæmund had in his day a great reputation for learning, and was regarded, like Friar Bacon, as a magician. He wrote a "Book of the Kings" from Harold Fairhair to Magnus the Good.

Safarik. See SCHAFARIK.

Safe, a receptacle for valuables, of iron or steel, or both combined. A safe to answer all requirements should be fire, explosive, acid, drill, and wedge proof. A fire-proof safe need only be so constructed that, though exposed to the intense heat of a conflagration, its inner recesses remain at a sufficiently low temperature to prevent combustion of the contents. A burglar-proof safe needs many other safeguards, and the history of safe making is mainly a record of struggles between the safe manufacturer and the burglar; the result is that

safes can now be obtained which are all but impregnable. The safe consists of an outer and an inner wall, the space between being filled with some fire-proof material such as asbestos, silicate cotton, gypsum, etc. The outside casting, which may be single or compound, naturally receives the greatest attention, and various are the devices of manufacturers to render it sufficiently hard and solid to resist the finely tempered drills of the burglar. To prevent wrenching, the door is secured by bolts moving straight or diagonally into slots on one or on all sides. These bolts are moved by the door handle, and the lock key fixes them in their positions.

With the modern safe of the best kind, the lock may be said to be the only vulnerable point, hence much care and ingenuity have been expended on its mechanism. The first great improvements in locks, as applied to safes, are due to Chubb of London, a name which still stands in the front ranks of safe-lock makers; but numerous patents, mostly of American origin, have in recent years been introduced. Of these the keyless permutation locks deserve particular mention, as they obviate the danger which arises from lost or false keys. Such locks allow of opening only after an indicator has been moved in accordance with a certain combination of numbers arranged before closing the safe. Some safe locks are so constructed that to be freed they require different keys on different days, some can only be opened at a certain hour, this being fixed on before the door is closed; while others again require two or more keys in charge of different persons; in fact, the arrangements contrived to render the plundering of safes next to impossible are too numerous even to mention. The connection of safes with electric alarms in a variety of ways forms another safeguard.

Safe Conduct, a protection granted by authority to persons traveling in an enemy's or in a foreign country to secure them against molestation. These special safe conducts have in modern times been mostly superseded by the passport system.

Safed, one of the four holy cities of the modern Jews in Palestine; in horseshoe shape round a hill 2,700 feet above the Mediterranean; 6 miles N. W. of the Sea of Galilee. Here dwell about 12,000 Jews, 5,000 Moslems, and 200 Christians. The town was overthrown by earthquakes in 1759 and 1837. A castle of the Christians, built during the Crusades, was destroyed by the Sultan of Damascus in 1220, and, having been rebuilt by the Templars, was again taken and destroyed by Beybars of Egypt in 1266. The Jewish colony has been settled here since the 16th century, and embraces many immigrants from Poland.

Safed Koh (White Mountains), a mountain range in Afghanistan. The W. portion of the chain separates the Herat river valley from the Murghab, while the E. Safed Koh forms the S. boundary of the Kabul basin. These mountains are quite alpine in their character, and some of the peaks exceed 15,000 feet in height. Among the spurs of the E. section are the passes leading from Kabul to Jalalabad, and from Jalalabad to Peshawur famous in the annals of British military expeditions into Afghanistan.

Safety Lamp. It has been long known that when methane, marsh gas, or light carburetted hydrogen, which is frequently disengaged in large quantities from coal seams, is mixed with 10 times its volume of atmospheric air, it becomes highly explosive. Moreover, this gas—the fire damp of miners—in exploding renders 10 times its bulk of atmospheric air unfit for respiration, and the choke damp thus produced is often as fatal to miners as the primary explosion. With the view of discovering some means of preventing these dangerous results, Davy instituted those important observations on flame which led him to the invention of the safety lamp. He found that when two vessels filled with a gaseous explosive mixture are connected by a narrow tube, and the contents of one fired, the flame is not communicated to the other, provided the diameter of the tube, its length, and the conducting power for heat of its material bear certain proportions to each other; the flame being extinguished by cooling, and its transmission rendered impossible. In this experiment high conducting power and diminished diameter compensate for diminution in length; and to such an extent may this shortening of length be carried that metallic gauze, which may be looked on as a series of very short square tubes arranged side by side, completely arrests the passage of flame in explosive mixtures.

The following are Davy's directions regarding the structure of his lamp: "The apertures in the gauze should not be more than $\frac{1}{2}$ of an inch square. As the fire-damp is not influenced by ignited wire, the thickness of the wire is not of importance; but wire from $\frac{1}{40}$ to $\frac{1}{50}$ of an inch in diameter is the most convenient. Iron wire and brass wire gauze of the required degree of fineness are made for sieves by all wire workers, but iron wire gauze is to be preferred: when of the proper degree of thickness, it can neither melt nor burn; and the coat of black rust which soon forms on it superficially defends the interior from the action of the air. The cage or cylinder should be made of double joinings, the gauze being folded over so as to leave no apertures. When it is cylindrical, it should not be more than two inches in diameter;

for in larger cylinders the combustion of the fire damp renders the top inconveniently hot, and a double top is always a proper precaution, fixed at the distance of half or three-quarters of an inch above the first top. The gauze cylinder should be fastened to the lamp by a screw of four or five turns, and fitted to the screw by a tight ring. All joinings should be made with hard solder; and the security depends on the circumstance that no aperture exists in the apparatus larger than in the wire gauze." The oil is supplied to the interior by the pipe projecting from the right side of the lamp, and the wick is trimmed by a wire bent at the upper end, and passed through the bottom of the lamp, so that the gauze need not be removed for this process.

When a lighted lamp of this kind is introduced into an explosive mixture of air and damp the flame is seen gradually to enlarge as the proportion of fire damp increases, till at length it fills the entire gauze cylinder. Whenever this pale enlarged flame is seen the miners should depart to a place of safety, for though no explosion can occur while the gauze is sound, yet at that high temperature the metal becomes rapidly oxidized and might easily break; and a single aperture of sufficient size would then occasion a destructive explosion. In a strong current of air the heated gas may be blown through the apertures of the gauze before its temperature is sufficiently reduced to prevent an explosion; but such a contingency may be guarded against by placing a screen between the draught and the lamp.

The first lamp which would safely burn in an explosive mixture of gas and air was contrived in 1813 by Dr. W. Reid Clanny of Sunderland. Into this lamp fresh air was blown through water, and heated air escaped through water by means of a recurved tube. Such a lamp was unfit for ordinary use. George Stephenson invented a safety lamp which was tried at the Killingworth pits in 1815, and the reader will find its merits discussed in Smiles's "Life of George Stephenson." Both Clanny and Stephenson applied wire gauze cylinders to their lamps after Davy's came into use, or at least after a communication about it had been made to the Royal Society in 1815. Stephenson's lamp, or as it is called the "Geordie," has a glass cylinder inside the wire gauze, the former having a cap of perforated copper. Small orifices below the glass admit the necessary air, and when the air becomes highly explosive the light goes out, so that the lamp does not get overheated. To enable it to burn well this lamp requires to be either held or suspended. What has long been known as Clanny's lamp (not his original lamp) consists of a cylinder of thick glass round the light, and on

the top of it resting on a metal ring is a narrower cylinder of wire gauze through which the feed air enters. In the first or earlier form of this lamp there is imperfect combustion and it is not very safe, but when the gauze is protected by a metal jacket or "bonnet," it appears to be secure in currents having a velocity of 25 feet per second. The Mueseler lamp resembles the Clanny in having a glass cylinder below and wire gauze above, but within the gauze top there is a central chimney opening just above the flame. The peculiar construction of this presents an obstruction of two gauzes to the inlet air, while the heated outgoing air only passes through one. Consequently the strong upward draught tends to draw the fresh air briskly through the gauze to the wick, thus keeping the two currents separate and insuring a good combustion.

For many years after the Davy, the Stephenson, and the Clanny lamp were introduced, the air-currents in coal mines seldom reached a speed of five feet per second. Nowadays, owing to improved ventilation, this speed sometimes exceeds 20 feet per second in the main airways, while in some mines it is not greatly less at the faces where the men are hewing the coal. The old forms of these lamps, though safe under former conditions, are consequently no longer secure. But the Davy lamp can be rendered safe by enclosing it in a lantern, and when so protected against strong currents it is called the "tin can Davy." Nevertheless, this lamp is falling out of use on account of the miserable light which it gives. In a report of the British Commissioners on Accidents in Mines, published in 1886, the subject of safety lamps was very carefully gone into. After describing a considerable number of these which had been experimented with, the report said: "Many of the more secure lamps are, however, rendered unsuitable for regular use by one or more of the following circumstances; either they yield a very poor light, or they require most careful handling to prevent the light from being extinguished, or they are exceedingly sensitive to oblique currents, or they are so complicated as to present great difficulties in putting them together and lighting them." The commissioners added: "But there are four lamps in which the quality of safety, in a pre-eminent degree, is combined with simplicity of construction and with illuminating power at least fully equal to that of any of the lamps hitherto in general use. These are Gray's lamp, Marsaut's lamp, the lamp of the latest pattern proposed by Evan Thomas (No. 7), and the bonneted Mueseler lamp. With the last care must be taken to avoid a considerable inclination to the vertical direction."

Of these four lamps the one by Marsaut, of the Bessèges Collieries, Gard, France, seems to have become the favorite; at least it is now very largely used. Like some other forms it is in principle a bonneted Clanny, but it is made with either two or three wire-gauze covers. In common with the other three lamps mentioned above as exceptionally safe, the lower portion consists of a glass cylinder surrounding the light on the top of which the gauzes are fixed. This lamp made with three gauzes will not cause an explosion in so strong a current as 50 feet per second, or even when the inner gauze is at a bright red heat, unless it is kept in the fire damp till the glass cracks; it may be said to be safe for three or four minutes. With two gauzes the light is two-thirds and with three gauzes it is one-half that of a standard candle, the light of the two-gauze kind being three and a half times greater than that of a Davy lamp.

To prevent safety lamps being surreptitiously opened in a mine it is necessary that they should be locked. One of the best ways of doing this is to fasten the oil vessel to the other part of the lamp by a riveted lead plug, and impress it at each end with a mark which should be varied from day to day. Lamps have also been constructed which go out when opened, and one kind can be opened only by help of a powerful magnet.

As respects the illuminants for a safety lamp seal oil and refined rape oil are the two staples, but the former is superior to the latter in burning qualities. Both are improved in this respect by the admixture of two parts of either with one part of petroleum or paraffin oil of a flashing point not lower than 80° F. This is considered a safe mixture. A patent was granted on Feb. 16, 1889, to J. Thorne for what is called the Thorneburry miners' safety lamp. The peculiarity of this lamp is that it is adapted to burn a heavy petroleum oil with a high flashing point, and gives a light from one to one and a half candle-power, which is much greater than that of other modern safety lamps. It was tested by Sir F. Abel and Professor Dewar, who reported that the lamp fulfilled the conditions essential to safety as laid down by the Commission on Accidents in Mines.

Portable, self-contained electric lamps that are perfectly safe have been devised which will furnish for several hours a considerably better light than that of the best safety lamp in use. As air is completely excluded from these lamps they give no indication of the condition of the atmosphere of a mine, so that their employment would require the use of fire damp detectors, and also of some ordinary safety lamps in order to prevent explosions.

Safety Pin, a pin having its point fitting into a kind of sheath, so that it may not be readily withdrawn or prick the wearer or others while in use.

Safety Plug, in locomotive engines, a bolt having the center filled with a fusible metal. It is screwed into the top of the fire box, that the metal may melt out by the increased temperature when the water becomes too low, and thus admit the water to put the fire out, and save the tubes and fire box. When the water is allowed to fall below a proper height, there is great risk of spoiling both the fire box and tubes by the intense action of the fire. This is called "burning them"; and tubes subjected to such a trial are unfit for use again, as the tenacity of the metal has been destroyed.

Safety Tube, a tube of various forms used in distillations, the preparation of gases, etc., to prevent the bursting of vessels from the sudden disengagement of gases, and their collapse from the sudden condensation of vapors or gases; to prevent the mingling of fluids contained in different vessels connected together by tubes; and to prevent explosion in that form of the oxy-hydrogen blowpipe in which the oxygen and hydrogen are contained in the same vessel.

Safety Valve, a valve which automatically opens to permit steam to escape or air to enter the boiler in order to prevent its explosion or collapse. Of these there are two kinds, the one internal, opening to the inner side when the pressure of steam is less than a given weight; the other opening to the outside when the pressure of steam exceeds a given weight. The latter is the more important, and consists commonly of a lever of the third class pivoted at one end; the valve, which is on a stem projecting from the lower side of the lever, is conical, and fits into a corresponding seat. The lever has notches for receiving the hook or loop of a weight which is suspended therefrom, and may be moved from one notch to another, like the weight of a steelyard, so that a greater or less amount of steam pressure may be required to lift the valve from its seat. In locomotive engines it is fixed at one end to a stud, and rests on the valve at a short distance from this stud. Its length is proportioned to the area of the valve, and a spring balance indicates the pressure in pounds per square inch on the boiler above atmospheric pressure. Safety valves are also used with boilers of various kinds, air and gas engines, proving pumps, and hydraulic presses. Locomotive engines have two valves placed on the boiler for the escape of steam when it exceeds certain limits. One of them is placed beyond the control of the driver, and is called the lock-up valve. The other is regulated by a lever and spring-balance at a little lower pressure than the lock-up valve.

Saffi, or **Asfi**, a seaport of Morocco; on a bay on the Mediterranean coast; 120 miles W. N. W. of the city of Morocco. It is a compactly built place, dominated by a fine ruined castle of the Sultans of Morocco dating from the 16th century. The place was held by the Portuguese for several years; they abandoned it in 1648. The fortifications they built still stand in part. The shrine of the Seven Sleepers here is visited by both Moslems and Jews. Saffi was at one time the chief seat of the trade of Morocco with Europe, and, though it has declined since the rise of Mogador, it still exports beans, maize, peas, wool, olive oil, etc., to the annual value of \$758,000, and imports cottons, sugar, etc., to the average annual value of \$329,500. Pop. 9,000.

Safflower, or **Bastard Saffron** (*Carthamus tinctorius*), a large thistle-like plant with orange-colored flowers, natural order *Compositæ*. It is cultivated in China, India, Egypt, and in the S. of Europe. An oil is expressed from the seeds, which is used as a lamp oil. The dried flowers afford two coloring matters (also called safflower), a yellow and a red, the latter (carthamine) being that for which they are most valued. They are chiefly used for dyeing silk, affording various shades of pink, rose, crimson, and scarlet. Mixed with finely-powdered talc, safflower forms a common variety of rouge. In some places it is used in lieu of the more expensive saffron, and for adulterating the latter. The oil, in large doses, acts as a purgative.

Safford, James Merrill, an American geologist; born in Zanesville, O., Aug. 13, 1822; was graduated at the Ohio State University in 1844; was State geologist of Tennessee in 1854-1860; was reappointed in 1871; and accepted the chair of natural science at Vanderbilt University in 1875. His publications include "Geological Reconnaissance of Tennessee"; papers on geological subjects, etc. He died in 1907.

Saffron, in botany, the *Crocus sativus*, a species with light purple flowers which come out in autumn. It grows in the S. of Europe and in parts of Asia. It is extensively cultivated in France, Austria and Spain, as it formerly was in England. The Spanish variety is the best for commercial purposes, though it is said that 100,000 flowers are necessary to produce one pound of saffron. The stigmas of the flower are from 1 to 1½ inches in length, narrow and rounded where they are attached to the style, but spreading and club-shaped near the extremity, which is truncated. They have an orange or brownish-red color, yellow in the narrower part, and an agreeable aromatic odor. The dried stigmas of the saffron crocus are sometimes used in dyeing and for coloring tinctures. They have a bitter taste, and impart a yellow color

Saffron

to water, alcohol, and oils. It was formerly met with in two forms, viz., hay saffron and cake saffron, but the former is now alone in demand. It is often adulterated



SAFFRON:
CROCUS SATIVUS.

with the florets of the safflower, or the marigold, but these are easily detected by their different shape and color. Saffron is slightly stimulant. It is used in the treatment of exanthemata, but chiefly as a coloring agent in preparing medicines and in cookery. The natives in India use saffron as a remedy in fever, melancholia, catarrhal affections of children, and as a coloring matter in some dishes.

Saffron, Bastard.
See SAFFLOWER.

Saga, an ancient Scandinavian tale, legend, or tradition, of considerable length, and relating either historical or mythical events; a tale, a history, a story, a legend. The Scandinavian sagas were compiled chiefly in the 12th and three following centuries. The most remarkable are those of Lodbrok, Hervara, Vilkina, Völsunga, Blomsturvalla, Ynglinga, Olaf Tryggva-Sonar, with those of Jomsvikingia and of Knyttlinga (which contain the legendary history of Iceland), the Heims-Kringla and New Edda, due to Snorri Sturlason.

Saga, a town of Japan, capitol of the province of Fizen, on the island of Kioo Lioo 74 miles N. E. of Nagasaki. It is important as a seaport and commercial center. A large number of brooks and channels traverse the town. The most important channel is that of Sentonofutsi, 50 miles in length. It unites the Gulf of Simabara with the Northern Sea, and greatly conduces to the inland commerce of the island. Pop. (1908) 36,051.

Sagapenum, a fetid gum-resin brought from Persia and Alexandria, and generally believed to be furnished by some species of the genus *Ferula*. It occurs either in tears or irregular masses of a dirty brownish color, containing in the interior white or yellowish grains. It has an odor of garlic, and a hot, acrid, bitterish taste. It is occasionally used in medicine as a nervine and stimulating expectorant.

Sagar, or **Saugor**, a well-built town in the Central Provinces of India, in a hilly tract, on a feeder of the Jumna. There

Sagasta

are here a Mahratta fort, now converted into British stores, barracks, and a magazine, as well as a jail (1846) and a park (1862); and there were formerly a college (removed to Jabalpur) and a mint (removed to Calcutta). Sagar has a trade in salt, sugar, and cloth.

Sagar, a low, swampy island at the mouth of the Hugli, the holiest branch of the Ganges; it is particularly sacred in the estimation of the Hindus. Multitudes of pilgrims annually resort to it in January, and after the three days' festival of purification is over a great fair is held. The island has an area of 225 square miles, but is very thinly inhabited, the greater part being jungle, the haunt of tigers and other wild animals. A lighthouse (1808), a meteorological observatory, and a telegraph station are the chief buildings.

Sagard, Théodat Gabriel, a French missionary to the Huron Indians in the 17th century. He wrote: "Travels to the Huron Country, situate in America, toward the Freshwater Sea and the Uttermost Limits of New France, called Canada; wherein is treated of all matters touching the country, the manners and character of the savages, their government and their ways, as well in their own country as when roaming; of their faith and belief; with a dictionary of the Huron language" (1632); also a "History of Canada and the journey made by the Friars Minor Recollects thither for the conversion of the unbelievers" (1836). A new edition of both works was published at Paris in four volumes, 1866.



SAGE.
a, flower.

Sagasta, Praxedes Mateo, a Spanish statesman; born in Torrecilla, July 21, 1827; became an engineer, but taking part

in insurrections in 1856 and 1866 had twice to flee for a time to France. He had a place in Prim's cabinet (1868); supported Amadeus; held office under Serrano; and under the new monarchy became leader of the Liberals, being premier in 1872, 1874, 1881-1883, 1885-1890, 1892-1895, and 1897-1899, thus conducting affairs during the American-Spanish War. He died Jan. 5, 1903.

Sage, the genus *Salva*, specifically *S. officinalis* and *S. grandiflora*. The first of these is the common garden sage, a native of the S. of Europe. It has blue flowers, and has run into many varieties. Formerly it had a high reputation as a sudorific, an aromatic, an astringent, and an antiseptic, but it has not now a place in the pharmacopœia. The Chinese use it as a tonic for debility of the stomach and nerves. It is employed in cooking for sauces and stuffing for luscious meats. Also the genus *Artemisia*.

Sage, Henry Williams, an American philanthropist; born in Middletown, Conn., Jan. 31, 1814; engaged in business with his uncle in 1832-1854, when he became interested in the lumber regions of Canada and the West, where he bought large tracts of timber and became one of the most extensive land owners in Michigan. He was elected to the Legislature in 1847 and subsequently associated himself with many philanthropic schemes. His early benefactions included the endowment of the Lyman Beecher lectureship at Yale College, the building and endowment of several churches and schools, and the building of the public library at West Bay City, Mich. He was elected a trustee of Cornell University in 1870, and gave to that institution \$266,000 for the Sage College for Women; \$50,000 for the Susan Lynn Sage chair of philosophy; \$200,000 for the Sage School of Philosophy; \$260,000 and an endowment of \$300,000 for the University Library Building; and over \$70,000 to other departments. He died in Ithaca, N. Y., Sept. 17, 1897.

Sage, Margaret Olivia (Slocum), an American philanthropist; born in Syracuse, N. Y., Sept. 8, 1828; spent several years teaching; and in 1869 married Russell Sage, a New York capitalist (1816-1906), who left an estate estimated at \$80,000,000. Soon after her husband's death she began making large gifts for charitable, educational, and other helpful purposes, and within three years had thus disposed of over \$16,000,000. Her greatest benefactions were the establishment of the Sage Foundation of \$10,000,000 for the improvement of social and living conditions throughout the United States, and gifts of \$1,000,000 each to the Rensselaer Polytechnic Institute and the Emma Willard School, both at Troy, N. Y.

Sageretia, in botany, a genus of *Rhamnea*; shrubs, often thorny, with slender, half-climbing branches, and black or dark-brown fruit. The leaves of *S. theezans*, growing in China, the Himalayas, and the Salt and Suleiman ranges, are used as a substitute for tea. Its fruit is eaten, as is that of *S. Branderthinana* and *S. oppositifolia*, also Indian species.

Sages of Greece, Seven, Solon, Chilo, Pittacus, Bias, Periander, Cleobulus, and Thales are those most generally named as the seven wise men of Greece, and they were the authors of the celebrated mottoes inscribed in more recent times in the Delphian Temple. Solon, through the imprudent course of his father, was compelled to engage in commercial adventures, and the celebrated law-giver sought foreign shores, the fruits of his travels being a varied experience of men, manners and institutions. His work on returning to Athens was that of a wise, unselfish patriot, who sought earnestly and with measurable success to compose the distractions, social and political, which then rent the city. His motto was, "Know thyself." Chilo, one of the ephori, was a Spartan, who early directed his attention to public affairs, and many of whose maxims are quoted by the ancient writers; one of the most famous of these was, "Consider the end." Pittacus was a native of Mytilene, in Lesbos, became a soldier, rose to supreme power in the State, acted with great patriotism, placed severe restrictions on drunkenness, and having done much for the peace and prosperity of the people, he voluntarily resigned his power. "Know thy opportunity," or, as it is sometimes rendered, "Be watchful of opportunities," is attributed to him. Bias, a native of Ionia, was a poetical philosopher, who studied the laws of his country and employed his knowledge in the service of his friends, defending them in the courts of justice and settling their disputes, and he made a noble use of his wealth. Said Bias: "Most men are bad." Periander was distinguished for his love of science and literature, which entitled him to be ranked among the seven wise men of Greece. Of Cleobulus, of the island of Rhodes, who was not less remarkable for strength than for beauty of person, but little is known. His favorite maxim was, "Moderation is best," or "Avoid excesses." Thales, a celebrated philosopher, born at Miletus, and founder of the Ionic sect, traveled like Solon in quest of knowledge, and it is said learned, while at Memphis, geometry, philosophy, and astronomy. He is said also to have invented several fundamental propositions which were afterward incorporated into the elements of Euclid. He taught the Greeks the division of the heavens into five zones, and the solstitial and equinoctial points, and approached

Saghalien

so near to the knowledge of the true length of the solar revolutions that he corrected their calendar and made their year contain 365 days.

Saghalien. See SAKHALIN.

Sag Harbor, a village in Suffolk co., Long Island, N. Y.; on Gardiner's Bay, and on the Long Island railroad; 100 miles E. by N. of New York city. There is an excellent harbor and regular steamboat connections with New York. Here are a union school, the Academy of the Sacred Heart of Mercy (R. C.), several banks, two weekly newspapers, and many handsome summer residences of New York business men. The village has flour and cotton mills, and manufactories of tools, watch cases, cigars, and leather. Sag Harbor was originally the site of Indian settlements, and many interesting relics have here been exhumed. The population varies, being largest during the summer season. Pop. (1910) 3,048.

Saginaw, a city of Michigan, the county-seat of Saginaw co. It is situated on both sides of the Saginaw river, at the head of deep-water navigation, 16 miles from Saginaw bay, and 96 miles N. W. from Detroit. The city is on a plateau about 30 feet above the river, which is spanned here by several public and railroad bridges. Among the railways entering the city are the Père Marquette, the Michigan Central, the Grand Trunk, and the Detroit and Mackinaw. The city covers an area of about 13 square miles, and has a population estimated in 1907 at about 50,000. There are 210 miles of streets, of which 55 miles are paved with brick or asphalt. Many of the streets are shaded, and the sidewalks are paved with brick or cement. There are 8 parks, covering 190 acres, Rust park, on an island in the Saginaw, occupying over 112 acres. The street cars have over 22 miles of track.

The leading educational institutions are St. Andrew's Academy, St. Mary's Academy, the Michigan Employment Institution for the Blind, the Germania Institute, the free Manual Training School, housed in a building that has cost \$200,000, and was donated to the city by one of its citizens; the Hoyt Library, and the east and west side public libraries. These supplement an excellent public school system, with two high schools, graduates from which are admitted without examination into the University of Michigan. Among the notable edifices are the city hall, the court house, the post office, Elks' temple, and the Masonic temple. The charitable institutions include St. Mary's Hospital, Saginaw General Hospital, the Woman's Hospital, St. Vincent's Orphan Home, the Home of the Friendless, and the Institution for the Blind.

Industries and Commerce.—Until recent years Saginaw was one of the greatest lumber manufacturing centers in the country. The year 1882, when 1,011,295,000 feet of

Saginaw

lumber were made in the city and vicinity, was the banner year for this industry. Of late years, however, the industry has declined, owing to the denudation of the pine forests, and bituminous coal-mining now ranks first among the industries. There are in operation, within the limits of the city or adjacent to it, 17 mines employing some 2,500 people and turning out annually about 1,500,000 tons of coal. The manufacture of lumber, sashes, doors, blinds, and other woodenware employed, according to the census of 1904, 1,142 people, and turned out a product valued at \$2,762,000 (1906: 4,000 employees and \$8,350,000 of product). In the same year the foundry and machine shops employed 651 people, and turned out a product valued at \$1,714,000 (1906: 1,200 employees and \$4,000,000 of product). The Père Marquette railroad shops and offices employ over 1,250 people. There is a plate-glass factory employing 250 men and turning out 1,000,000 feet of glass annually. The land in the neighborhood of the city is admirably adapted for raising sugar-beets, and the sugar factory consumed in 1906 80,000 tons of beets raised on 10,000 acres, yielding 16,000,000 pounds of sugar. Other industries of importance are the manufacture of flour and grist, malt liquors, furniture, tools, pianos, matches, wagons and carriages, automobiles, salt, brick, etc. The industrial history of Saginaw since 1890 is briefly summarized in the following: In 1890 there were 335 manufacturing establishments with \$12,407,000 of capital, 5,305 wage-earners receiving \$2,272,000 in wages, and turning out a product valued at \$11,303,000. The census of 1900 showed the existence of 400 establishments with \$7,559,000 of capital, 4,866 wage-earners receiving \$1,937,000 in wages, and an output valued at \$10,034,000. The general decrease was due to the decline of the lumber industry. Since then, however, owing to the introduction of new industries, there has been a general increase, as may be seen from a comparison of the census of manufactures for 1904 (in which only the factory industries were considered, to the exclusion of neighborhood industries, hand trades, and mines) with the corresponding figures for 1900:

	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials	Value of Products
1900	185	\$7,134,000	4,062	\$1,612,000	\$5,164,000	\$8,681,000
1904	180	7,613,000	4,682	2,096,000	5,514,000	10,404,000
Per cent. Increase	..	6.7	15.3	30.0	6.8	19.8
Per cent. Decrease	2.7	....	....	....	....	....

Saginaw is an important distributing point for northern Michigan, its wholesale trade being particularly important in hardware, agricultural implements, boots and shoes, dry goods, and groceries. The transactions of its clearing house have increased from over \$16,164,000 in 1901 to about \$31,491,000 in 1907, and the resources and liabilities of its banks have increased from \$7,989,000 in 1896 to \$14,687,000 in 1907.

History, Administration, and Population.—The present city of Saginaw was formed in 1890 by the consolidation of Saginaw City and East Saginaw, situated on opposite sides of the river. The former was settled in 1815, and received a city charter in 1857, while the latter and more important settlement was founded by New York capitalists in 1849, and received a city charter in 1859. Under the revised charter of 1897, the government is vested in a mayor, elected for two years, and a unicameral council, composed of one member from each of the twenty wards. The school board is also elective, most of the other officials being appointed by the mayor or council. The annual expenditure is about \$1,300,000, and the bonded debt amounted in 1907 to \$1,507,000. The city owns a water plant valued at \$885,000. The assessed valuation of all property was \$25,000,000 in 1907.

The population was 10,525 in 1880, 46,322 in 1890, 42,345 in 1900, and 50,510 by the census of 1910. The population was composed in 1900 of 20,488 males and 21,857 females. In the same year there were only 348 negroes, and 11,435, or 27 per cent. of the total population, were foreign-born. The great majority of the latter was composed of 4,683 Germans and 4,312 Canadians.

Saginaw Bay, the largest indenture of Lake Huron on the United States side, entering the S. peninsula of Michigan in the E. part of the State. It is 60 miles long, 30 miles in extreme width, and is bordered by Iosco Bay, and Tuscola and Huron counties. It affords excellent navigation, and is a safe harbor for large vessels. Its surface is usually rough, but not dangerously so, when the open lake is comparatively smooth. The color of the water is plainly different from that of the open lake, being a brownish-green, often termed "tea-water."

Saginaw River, a small river of Michigan, formed by the junction of the Flint and Shiawassee rivers, at a point in Saginaw co., of which it is the principal stream, about 8 miles S. by W. of Saginaw city. Though only about 30 miles in length, the main stream receives through its branches the drainage of a large area. It enters Saginaw bay about 5 miles below Bay City. It is navigable to Saginaw.

Sagitta, in astronomy, the Arrow; a small northern constellation, one of the 48 ancient asterisms. It is situated between

the hill of the Swan and Aquila, and is traversed by a branch of the Milky Way. A nebula in Sagitta was resolved by Sir William Herschel, in 1783, into a cluster of stars. In geometry, (1) the versed sine of an arc. (From the resemblance of an arrow standing upright on the string of a bow.) (2) The abscissa of a curve. In zoölogy, the sole genus of *Chætognatha*, with several species, found on the surface of the ocean all over the world. They are transparent unsegmented worms, about an inch long, without parapodia, but the chitinous cuticle is produced into a finely striated lateral fin on each side of the body and tail. At each side of the head are strong claw-like chitinous processes which serve as jaws. The genus presents analogies with both the *Nematoidea* and the *Annelida*; but its development is, in some respects, unlike anything at present known in either of these groups.

Sagittarius (the Archer), in astronomy, the ninth sign of the zodiac, into which the sun enters Nov. 22. The constellation consists of eight visible stars. It is represented on celestial globes and charts by the figure of a centaur in the act of shooting an arrow from his bow.

Sagittary, a terrible archer, half beast and half man, whose eyes sparkled like fire, and struck dead like lightning. He is introduced into the Trojan armies by Guido da Colonna.

Sagittate, in botany, a term applied to the form of leaf shaped like the head of an arrow; triangular, hollowed at the base, with angles at the hinder part.

Sagittated Calamary, in zoölogy, the genus *Ommastrephes*, and especially *O. sagittatus*, used for bait in the cod-fishery on the banks of Newfoundland. Gould says that "so swift and straight is their progress that they look like arrows shooting through the water."

Sago, a nutritive farinaceous substance obtained from the pith of several species of palms, principally, however, from *Sagus* (*Metroxylon*) *Rumphii*, the spiny, and *S. laevis*, which is spineless. For the natives of the Eastern Archipelago this palm is a source of vegetable food naturally more abundant and less variable in its yield than rice. The stem consists of a thin hard wall, about two inches thick, and of an enormous volume of a spongy medullary substance, which is edible. Each tree yields about 600 pounds of pith. There are three well-marked varieties of this palm. The tree grows in Java, Sumatra, Celebes, Borneo, Malacca, and Siam. The only countries, however, where it is found growing in large forests are New Guinea, the Moluccas, Celebes, Mindanao, Borneo, and Sumatra, being widely spread over the Moluccas, but confined to particular parts of the others.

There is no regular fixed season for extracting the farinaceous pith, which is taken as occasion requires and as the individual tree becomes mature, which is at about 15 years.

These palms propagate themselves by lateral shoots as well as by seed, and they die after producing fruit, so that a sago plantation once formed is perpetual. Sago meal is eaten by the natives in the form of pottage, and also partially baked in earthenware molds into small square biscuits. Large quantities of the meal in its pure state are sent to Singapore from the E. islands, where it is granulated or pearled and bleached by the Chinese for shipment to Europe. It comes into commerce in three forms, the common brown sago, pearl sago, and sago flour. It is made by two processes, the starch grains being burst in some samples and not in others. The chief uses of sago in Europe are for feeding stock, making starch, and by cocoa manufacturers for grinding up and giving thickness or consistence to the dietetic beverage made with it.

The stem, about 15 to 20 feet, is cut into lengths, split open, and the pith dug out and placed in a vessel with a sieve bottom. Water is applied to separate the flour and carry it into a second vessel, where it is soon deposited. The water is then run off, and the flour dried and put into little baskets made of sago leaves. The produce of a tree ranges from 600 to 750 pounds. Pearl sago (which the Chinese of Malacca prepare and send to Singapore) is in small white spherical grains, varying in size from that of a poppy seed to a grain of millet. There are several varieties which differ much in color, some being white and others reddish brown like radish-seed. One kind of granulated sago from India has been introduced under the name of tapioca — the real TAPIOCA (*q. v.*) being a totally different substance. Sago is not entirely soluble in hot water like ordinary starch, and can therefore be employed in making puddings, etc., and in this way forms a valuable article of food, being cheap, light, nutritious, and easy of digestion.

Sago Starch, the starch extracted from the stem of *Sagus rumphii*, and probably of other species of palm. The granules are in size as large as those of arrow root, somewhat elongated in form, rounded at the larger end, compressed or truncated at the smaller, and varying in length from .0008 to .0020 of an inch. The hilum, which is situated at one end of the granule, is in some a minute circle, in others a slit or cross. Sago is largely used in the manufacture of the so-called soluble cocoas, and is also frequently added to the cheaper varieties of arrow root.

Sagoín, or Sagouin, the native South American name of a genus (*Callithrix*) of Brazilian monkeys of small size, and remarkably light, active, and graceful in their movements.

Sagoskin, See ZOGOSKIN.

Saguenay, a river of Canada, in the province of Quebec; formed by two outlets of Lake St. John, which unite about 9 miles below the lake, from which point the river flows S. E. and falls into the St. Lawrence at Tadousac harbor; length about 100 miles. For many miles of the latter part of its course the banks are very lofty, and in some parts there are precipices more than 1,000 feet high. Ships moor at rings fixed into some of the precipitous walls of rock, the water being so deep as to be unsuitable for anchorage. The Saguenay is navigable for vessels of any size to Ha Ha Bay, a distance of about 50 miles to 60 miles from the St. Lawrence, and at high water for vessels of large dimensions from 15 miles to 18 miles farther. It is visited by a great many tourists on account of its remarkable scenery.

Saguerus, a genus of *Areceæ*. *S. saccharifer* (*Arenga saccharifera*) is from 20 to 25 feet high, and is very common in the islands of the Indian Archipelago, the Moluccas, and the Philippines. The spadices are wounded and then pounded without detaching them from the tree. This causes them to yield a quantity of saccharine matter, which may be boiled into sugar or be converted by fermentation into intoxicating liquor. When the trees are exhausted by this drain on their energies, sago is obtained from the trunk, as much sometimes as 150 or 200 pounds from a single tree. The cabbage-like bunch of young leaves at the summit of the stem is eaten, the leaf stalks yield strong and useful fibers, and the mid-rib of the leaves is used for pens and for tubes through which to blow arrows.

Sagum, the military cloak worn by the Roman soldiers and inferior officers, as distinguished from the paludamentum or cloak worn by the superior officers. It was the garb of war as the toga was of peace.

Saguntum, a former town of Spain, S. of the Ebro, about 3 miles from the coast. It is famous in Roman history; its siege by Hannibal in 219–218 B. C. having given rise to the second Punic war. The site is occupied by the modern town of Murviedro.

Sagus, in botany, a genus of *Calameæ*, sometimes made a sub-genus of *Metroxylon*. Spikes terminal; seeds with internal markings like nutmegs. *S. lævis*, of Rumphius (*Meroxylon sagu*), and *S. genuina* yield the finest sago. They form great forests in the Moluccas. The bristles of *S. filaris*, a

Malay plant, are dried and used for sewing linen garments.

Sahara (Arabic Sáh'ra), the vast desert region of North Africa, stretching from the Atlantic to the Nile, and from the S. confines of Morocco, Algeria, Tunis, and Tripoli S. to the vicinity of the Niger and Lake Tchad. It is usual to regard the Libyan Desert, lying between Egypt, the Central Sudan, and Tripoli, as a separate division. Both are, however, links in the chain of great deserts that girdle the Old World from the Atlantic coast across Africa, Arabia, Persia, Turkestan, and Mongolia to the Pacific. It was long customary to assert that the Sahara was the bed of an ancient inland sea, and that it consisted of a vast, uniform expanse of sand, swept up here and there into ridges by the wind. But this idea is utterly erroneous. Since the French became masters of Algeria, and more especially in recent years, they have completely revolutionized our knowledge of the Sahara, at all events of the country immediately to the S. of Algeria and Tunis. The surface, instead of being uniform and depressed below sea-level, is highly diversified, and attains in one place an altitude of fully 8,000 feet. But, in spite of our knowledge of this part of the world having been so greatly increased of late, there are several extensive tracts as to which we have next to no information.

From the neighborhood of Cape Blanco in the W. a vast bow or semicircle of sand-dunes stretches right round the N. side of the Sahara to Fezzan, skirting the Atlas Mountains and the mountains of Algeria. This long belt of sand hills varies in width from 50 to 300 miles, and is known by the names Igidi and Erg, both meaning "sand hills." The hills rise to 300 feet (in one place, it is said, to more than 1,000 feet), though the average elevation is about 70 feet. They are composed of pure quartz sand, reddish brown in color; are stationary in character, though constantly changing their outward form and configuration; and lie as a rule in parallel chains, whose outward slopes are fairly gentle, but their inward slopes steep. Water is nearly always to be found below the surface in the hollows between the different chains of these sand hills, and there a few dry plants struggle to maintain a miserable existence. S. of Algeria, on the other side of the Erg, the country rises into the lofty plateau of Ahaggar (4,000 feet), which fills all the middle parts of the Sahara. Its surface runs up into veritable mountains 6,500 feet high, which, incredible as it may seem, are covered with snow for three months in the year. On the S. it apparently falls again toward the basins of the Niger and Lake Tchad; nevertheless there are mountain ranges along the E. side reaching 8,000 feet

in Mount Tusidde in the Tibbu country, and a mountain knot in the oasis of Air (or Asben) which reaches up to 6,500 feet. Mountainous tracts occur also in the W., between Morocco and Timbuctoo, but of inferior elevation (2,000 feet). These mountainous parts embrace many deep valleys, most of them seamed with the dry beds of ancient rivers, as the Igharghar and the Mya, both going some hundreds of miles N. toward the "shots" of Algeria and Tunis. These valleys always yield an abundance of water, if not on the surface in the watercourses, then a short distance below it, and are mostly inhabited, and grazed by the cattle and sheep and camels of the natives.

Another characteristic type of Saharan landscape is a low plateau strewn with rough blocks of granite and other rocks, and perfectly barren. These elevated stone fields, called "hammada" — the best known is the Hammada el-Homra, S. E. of Ghadames and on the border of Tripoli — alternate with tracts of bare flat sand, with broad marshes, where water has stood and evaporated, leaving salt behind it, and with extensive tracts of small, polished, smoothly-rounded stones. In very many parts of the Sahara, especially in the valleys of the mountainous parts, in the recesses or bays at the foot of the hills, alongside the watercourses, and in the hollows of the sand-dunes, in all which localities water is wont to exist, there are oases — habitable, cultivable spots, islands of verdure in the midst of the ocean of desert. These oases occur in greatest number along the S. face of the Atlas and the Algerian mountains, on the N. side of the Ahaggar plateau, and along certain definite lines, the chief of which extend between Murzuk in Tripoli and Lake Tchad, the Igharghar and Sokoto by way of Air, the Igharghar and the bend of the Niger by way of Timissao, Morocco and Cairo by way of Tafilet, Tuat (Ainsalah), and Ghadames, and Morocco and Timbuctoo by way of Tenduf and Taudeni. These lines of oases mark the great caravan routes between the Central Sudan States and the Mediterranean.

A large portion of the Sahara, though not the whole, was undoubtedly under water at one time, probably in the Cretaceous period and earlier. Then the surface seems to have been in great part elevated, so that the waters remained only in some lakes and in gulfs near the Mediterranean coast. The physical features that at present characterize the Sahara are undoubtedly due in their broad essentials to atmospheric, chemical, and even mechanical causes, and only in a very small degree to the action of water. Water has exercised scarcely any influence on a large scale here since the Tertiary period; and there can be no doubt that a process of desiccation, similar to that which is now going on in the Turkestan deserts,

has been in operation throughout the whole of this region from the earliest historic time. The Romans had colonies or military posts a long way S., in what are now desert regions; and both Herodotus and Pliny tell us that the elephant, the rhinoceros, and the crocodile, all animals that only live near abundant supplies of water, were common throughout North Africa in their day. None of the Egyptian inscriptions or animal sculptures represent the camel, nor do the Greek and Roman historians mention it either as being a denizen of North Africa. The camel is now the principal carrier across the Sahara, and must have been introduced since the beginning of the Christian era. The inference from these and other facts is that the process of desiccation has gone on more rapidly during the last 2,000 years. The position of the sand-dunes is determined by the unchangeable configuration of the surface; the wind and chemical action do all the rest. The sand itself is simply the Saharan rocks (granite, gneiss, mica-schists, and cretaceous rocks) ground to dust.

The great heat by day causes the rocks to expand; the great fall of the temperature at night, combined with the enormous evaporation that then takes place, makes them split and crack and break into pieces; and the strong, often violent, winds use these fragments like files, or even sand blasts, with which to grind to pieces other rocky fragments. The terrors of the desert sand storm have often been described. Thick deposits of Saharan quartz sand dust were discovered by the "Challenger" on the floor of the Atlantic a long way W. of the African coast. The sand in the dunes is so dry that in several places the tread of a camel or a man will make the hill hum, or even thunder, as a vast quantity of it slips down to a lower level. The range of temperature is exceedingly great: often the thermometer falls from considerably more than 100° F. during the day to just below freezing-point at night. In the W. of the Sahara the daily average is 85° in the shade in the month of May. Rain does fall in certain parts of the Sahara with more or less frequency; but in most districts on the average after intervals of two to five years. After a fall of rain it is not unusual to see the river beds in the mountainous regions filled with foaming torrents. But the atmosphere is so dry and clear that objects can be seen and sounds heard at a vast distance. The mirage is no uncommon feature. Owing to this extreme dryness of the air, the Sahara, especially where it is reached by the prevailing W. and N. winds, is very healthy.

The plant life is very rich in the oases, the date palm, which has its home in these regions, being the principal ornament as well as the most valuable possession of these fertile spots. But fruit trees, as oranges,

lemons, peaches, figs, pomegranates, etc., are also grown, with cereals, rice, durrha, millet, and such-like food crops. In the desert regions the plant life is confined principally to tamarisks, prickly acacias and similar thorny shrubs and trees, salsolaceæ, and coarse grasses. The animals most commonly met with include the giraffe, two or three kinds of antelope, wild cattle, the wild ass, desert fox, jackal, hare, lion (only on the borders of the desert), ostrich, desert lark, crow, viper, python, locusts, flies. The people keep as domestic animals the camel, horse, ox, sheep, and goat.

The human inhabitants, who are estimated altogether at between 1,400,000 and 2,500,000, consist of Moors, Tuareg, Tibbu, Negroes, Arabs, and Jews. The Moors and Tuareg are both Berbers; the former live between Morocco and Senegal, the latter in the middle, S. of Algeria and Tunis. The Tuareg are great traders, and control the principal caravan routes. The Tibbu, who number about 200,000, and are regarded as being ethnically intermediate between the Berbers and the Negroes, occupy the oases between Fezzan and Lake Tchad. The Arabs of pure stock are very few; they have become mixed with the Berbers and the Negroes. The most valuable products of the Sahara are dates and salt, the latter collected on the salt pans, and made from the rock-salt of Taudeni in the W., and of Kawar (Bilma) in the E.; the remaining products are horses, soda, and a little saltpeter. But for many long years there has been a very active trade carried on by caravans between the Central Sudan and Niger countries and the Mediterranean States, the ivory, ostrich feathers, gums, spices, musk, hides, gold dust, indigo, cotton, palm oil, shea butter, kola nuts, ground nuts, silver, dates, salt, and alum of the interior lands being exchanged for the manufactured wares (textiles, weapons, gunpowder, etc.) of European countries.

Within recent years scientific men have eagerly discussed the possibility of reclaiming the Sahara from the arid desolation to which such a vast proportion of its surface is now abandoned. That no amelioration can be effected in the great bulk of its area is pretty well agreed; and if the desiccation is principally due, as has been maintained, to continental changes of elevation, it is pretty certain that nothing can be done. But the destruction of forests on the N. mountain slopes is believed to be a coöperating cause. If so—for the fact is doubtful—this could be remedied. Two other schemes have, however, been proposed, and one of them had been carried out with admirable success. W. from the Gulf of Cades stretches for 250 miles a chain of salt lakes (*shoots*) right along the S. of Tunis and Algeria to the meridian of Biskra. Into

these Captain Roudaire proposed (1874) to let the water of the Gulf of Cades by cutting through a ridge, 13 miles wide and 150 feet high, and so making an inland sea of some 3,100 square miles in area with an average depth of close upon 80 feet. The scheme is, in point of engineering, practicable; but it is questionable whether it would accomplish the desired effect of modifying the climate and soil of the surrounding regions any more than the Sea of Aral or the Caspian does. At all events the proposal has been allowed to drop. In 1877 Donald Mackenzie propounded the idea of flooding the Western Sahara, the district called El Juf, by letting in the waters of the Atlantic; but the German traveler Lenz ascertained that El Juf was not a vast depression, but only a small valley. The other measure is the boring of artesian wells, and with the water so obtained irrigating the soil in the vicinity. This method of reclaiming the desert, which was apparently known to the ancients, has been prosecuted by the French with great energy since 1856. By 1890 they had made a string of these wells from the cultivated districts of Algeria as far as Tugurt, on the edge of the desert S. of Biskra. Water is generally found at depths varying from 10 to 300 feet, and in great abundance. Wherever these wells have been bored the date palm groves and the orchards have increased greatly in extent, and the population has become much denser.

Saharanpur, a town of British India, in the Northwest Provinces; 125 miles N. of Delhi; is the station for the hill sanatorium of Masuri. It has an old Rohilla fort, a handsome new mosque, St. Thomas' Church (1858), numerous administrative offices, and government botanical gardens (1817). It was formerly notorious for its malaria, but has vastly improved in this respect since a marsh to the E. of the town has been drained. Pop. (1901) 66,254.

Sahib, the common term used by natives of India and Persia in addressing or speaking of Europeans. The feminine form is Sahibah.

Sahlite, in mineralogy, a name formerly applied to a grayish-green variety of pyroxene from Sala; but now adopted by Dana and others for a group, viz., the lime-magnesia-iron pyroxene.

Sai, the name applied to the weeper-monkey of Brazil. See SAPAJOU.

Saiga, in zoölogy, a genus of *Bovidae*, with one species, *S. tatarica*, from Eastern Europe and Western Asia. They differ so much from all other antelopes that some naturalists have made them a distinct family. Also, any individual of the genus *Saiga*. They are about the size of a fallow deer, tawny yellow in summer, and light gray in winter; horns, found only in the

male, less than a foot long, slightly lyrate and annulated. The nose is large, fleshy, and probosciform, and the nostrils are widely expanded, so that the animals have to walk backward as they feed.

Saigon, capital of French Cochinchina; on the Saigon, a branch of the delta of the Mekhong; about 60 miles from the sea. The present town has grown up under French influences since 1861, and with its fine streets and squares and boulevards is one of the handsomest cities of the East. It has a magnificent governor's palace, a cathedral (1877), two higher colleges, an arsenal, floating dock and drydock, administrative offices, and a botanical and zoölogical garden. Saigon (properly Gia-dinh) is the most important port between Singapore and Hong Kong. It exports every year rice, chiefly to China, the Philippines, Japan, and the Straits Settlements, to the value of \$7,200,000 to \$8,600,000. The remaining exports include fish, salt, cotton, wood, beans, and hides. The port is entered by 400 to 500 vessels of 460,000 to 560,000 tons annually. Previous to the French occupation (1861) Saigon, though only a collection of common Siamese huts, was the capital of the province of Lower Cochinchina. Pop. (1901) 50,870, principally Chinese, Annamese, and French; pop. of the business suburb of Cholon (1901) 130,000, more than half Chinese.

Sail, a piece of canvas cloth spread to catch the wind, so as to cause or assist in causing a ship or boat to move through the water. Sails are supported by the masts, spars, or stays of the vessel, and take their names from the mast, yard, or stay on which they are stretched, as the mainsail, etc. The upper edge of a sail is the head, the lower edge the foot, the vertical edge the leech, the weather side or edge (that is, the side or edge next the mast or stay to which it is attached) of any but a square-sail is the luff, and the other edge the after leech. The clews or clues are the lower corners of a square sail, or the lower after corner of a fore-and-aft sail. A tack is the lower weather corner of a square sail, or the lower forward corner of a fore-and-aft sail. The earing is the upper corner of a square sail. A square sail is one that is extended by a yard hung (slung) by the middle and balanced. A sail set on a gaff, boom, or stay is called a fore-and-aft sail. Also, that part of the arm of a windmill which catches the wind.

Sailcloth, a strong linen, cotton, or hempen cloth used in making sails. The best is made of flax, and combines flexibility with lightness and strength.

Sailing, the act of moving on water, or the movement of a ship or vessel impelled by the action of wind on her sails; act of setting sail or beginning a voyage; also,

smooth impulsion through the air, as in a balloon; or the aërial passage of a bird. In navigation, the art of directing a ship on a given line laid down on a chart. It is called plane sailing when the chart is constructed on the supposition that the surface of the ocean is an extended plane; and globular sailing, when the chart is a globular chart, or constructed on the hypothesis that the earth is a sphere, the ship being then supposed to be sailing on the arc of a great circle. Sailing order, or order of sailing, is any determinate order preserved by a squadron of ships. It usually implied, in the days of sailing fleets, one, two, or three parallel columns; but it is at the disposition of the admiral or commodore.

Sailor's Grave, The. See SABLE ISLAND.

Sainfoin, a plant, *Onobrychis sativa*, natural order *Leguminosæ*, a native of Central and Southern Europe and part of Asia.



SAINFOIN.

It has been in cultivation for centuries for the purposes of supplying fodder for cattle either in the green state or converted into hay. It is a pretty plant with narrow pinnate leaves and long spikes of bright pink flowers; stem $1\frac{1}{2}$ –2 feet high.

Saint, a name applied in the New Testament to the members of the Christian community generally, but restricted by ecclesiastical usage from very early times to those who have been specially remarkable for their personal virtues and their eminent services to the cause of religion. In the ages of persecution the quality which most of all challenged the admiration and reverence of the faithful was naturally constancy in the profession and the defense of the Christian faith; and the honors of the martyrs, even before the age of persecution

had passed, were extended to confessors, and eventually to all who died in the odor of sanctity, and especially to those who also obtained the reputation of performing miracles. In general, the saints of the Catholic Church are distributed into several classes, chiefly in relation to the special character of the ecclesiastical offices appropriated to their honor. Thus we find enumerated (1) apostles and evangelists; (2) martyrs; (3) confessors, a name applied primitively to those who had courageously undergone imprisonment or pains for the faith without gaining the final crown of martyrdom, but in later times understood of all who, not being martyrs, were eminent for sanctity of life; (4) doctors or saints eminent for sacred learning; (5) virgins; (6) matrons and widows. Anciently the title of saint was bestowed on an individual by the members of the particular Christian community to which he belonged, or to which his merits were most familiar. In the earliest times, however, the letters of St. Cyprian show that caution was observed by the bishops to guard against the recognition of undeserving persons. It was not till the 12th century that the Pope reserved to himself the exclusive right to add to the roll of saints, or that a regular form of procedure was established in the Roman courts for the purpose of testing and of solemnly pronouncing on the title of persons, who had died with a reputation for sanctity, to the public *cultus* of the Church. A saint, according to the received interpretation, is one who has exercised the three theological virtues of faith, hope, and charity, and the cardinal virtues, prudence, justice, fortitude, in a heroic degree, and has persevered in this exercise till death. Sanctity may exist without miracles; as, according to one of the most commonly alleged instances, there is no record of John the Baptist having wrought miracles; and, on the other hand, miracles may be performed by heretics or sinners. Nevertheless, by the existing discipline of the Roman Church, before a decree of canonization can be obtained, the rule requires evidence of such miracles as an expected fruit of heroic faith and as a confirmatory sign of sanctity after proof has been given of the heroic virtues.

It is difficult to estimate with anything approaching to exactness the number of saints who have received *cultus* as such in the various churches of Christendom from the earliest times. Of many almost all record has perished, except their names commemorated in some ancient calendar or preserved in the dedication of some church or sacred locality. The fullest list is that to be found in the index or general table in the 61st volume of the colossal work of the Bollandists. From these tables it appears that biographies or notices have been given

of about 20,500 saints. The catalogue which possesses the highest ecclesiastical authority is that of the "Roman Martyrology," revised by order of Gregory XIII. in 1586 by Baronius, and frequently supplemented since. It comprises the saints of every class to whom the Roman Church gives authentic recognition, and names about 2,700 in all, including about 20 saints of the Old Testament, arranged as in a calendar according to the days of their celebration; while the recital for each day terminates with the clause, "And in other places of very many other holy martyrs, confessors, and holy virgins." About two-thirds of every month in the Roman calendar is occupied with special saints' days, though, on some of these, minor saints are commemorated by a collect or prayer. But the Roman calendar is modified or supplemented in a greater or less measure in every national Church, every diocese, and every religious order or community. Thus to the Roman breviary in England is added a supplement containing the offices of the English saints who sometimes displace or transfer to another day the saints of the Roman calendar. The fixed calendar of saints' days in use in various Catholic countries or communities thus varies considerably. At the end of the useful handbook by Canon Husenbeth, entitled "The Emblems of Saints," will be found printed in parallel columns for purposes of convenient comparison eight such calendars—the Roman calendar, two old English calendars, the Scotch, the French, the Spanish, the German, and the Greek. It should further be noted that the actual calendar of saints' days in use in any given year can never quite correspond with the fixed calendar of this or that diocese or community. The great movable feasts determined by the annually varying date of Easter constantly disturb the order of the calendar, and lead to transferring the observance of a saint's day to some proximate *feria* or vacant day, and in some cases to extinguishing it altogether. The complicated rules which regulate these changes are based upon the different ranks accorded to the feasts—doubles of the first class, doubles of the second class, greater doubles, doubles, semi-doubles, and simples—in their relations to one another and to the Sundays and movable feasts which also have their various ranks.

In Christian art representations of the saints are often marked by the nimbus, aureole, or glory, and many of the saints are pictured as accompanied by emblems, by which they could readily be recognized. Apart from symbols which only typified the person indicated (as a shepherd for Christ, a gourd or a whale for Jonah), the figure of the saint is given with an added emblem. Thus the four evangelists were symbolized by four rivers, the four rivers of paradise.

The adoption of the four living creatures (Rev. iv: 6) for the same purpose does not appear to have taken place till the 5th century; but soon it became a constant practice to represent St. Matthew by or with the man, Mark with the lion, Luke with the ox, John with the eagle. The 12 apostles are depicted as 12 men, 12 sheep, or 12 doves. St. Peter, for obvious reasons, is represented with the keys or with a fish; many of the saints with the instruments by which they were martyred—St. Paul with a sword; St. Andrew with a cross; St. Simon with a saw; St. James the Less with a club; St. Matthew with a lance; St. Catharine with a wheel; St. Lawrence with a gridiron; others with objects connected with their history or in some other way—St. George with a dragon; St. Matthew with a purse. St. James the Elder is figured as a pilgrim.

A martyr who had a special interest in a place was called its patron saint. As early as the 4th century the possession of a relic was enough to constitute the saint a patron of its possessors. His being born in a place or having died there was a good reason for choosing the patron saint. The angels Michael, Gabriel, and Raphael were chosen patrons of churches as early as the 6th century. Trades and professions had their patrons, and every disease a saint gifted for its cure. The patron saint defended his votary, heard his prayer, helped him in difficulty, and even protected him at the day of judgment from the consequences of his sin. Among well-known patron saints were St. George of England, St. Andrew of Scotland, St. Patrick of Ireland, St. David of Wales, St. Denis of France, St. James of Spain, St. Nicholas of Russia, St. Stephen of Hungary, St. Mark of Venice.

St. Affrique, a town of France; in the department of Aveyron; 56 miles N. W. of Montpellier; in a beautiful valley in the midst of meadows, orchards, and vineyards. There is a considerable trade in wool and in the celebrated Roquefort cheese. Pop. (1901) commune, 6,699.

St. Albans, a city and county-seat of Franklin co., Vt.; on the Central Vermont railroad; 3 miles E. of Lake Champlain, and 59 miles N. N. W. of Montpelier. It is built on elevated grounds surrounded by a fertile agricultural region as well as by beautiful scenery. It contains a number of sulphur springs which add to its attractions as a summer resort. The city contains St. Albans Academy, the Warner Home for Little Wanderers, Warner Hospital, Franklin Library, Vila Barlow Convent, electric lights, National and State banks, and daily, weekly, and monthly periodicals. It has large locomotive and railroad car works, and one of the largest creameries in the world. The assessed property valuation exceeds \$3,500,000. In 1864 St. Albans was raided by Confederates from Canada, and in

St. Albans

1866 was for a time a Fenian headquarters. It received its city charter in 1897. Pop. (1900) 6,239; (1910) 6,381.

St. Albans, a municipal borough and cathedral city in Hertfordshire, England, 24 miles N. W. of London. It stands close to the site of the ancient Verulamium, and owes its name to St. Alban, the proto-martyr of Britain. St. Albans figures prominently in English history, and two battles were fought here (1455 and 1461) between the rival houses of York and Lancaster. The cathedral is a large and beautiful structure recently restored, and St. Michael's contains the remains of and a monument to Lord Bacon. Straw plaiting and silk throwing are the chief industries. By a readjustment of the dioceses of Rochester and Winchester, the See of St. Albans was created in 1877. St. Albans gives name to one of the parliamentary divisions of Hertfordshire. Pop. (1901) 16,019.

Saint-Aldegonde, Baron of. See MAR-NIX, PHILIPP VAN.

St. Aloysius. See GONZAGA, LUIGI.

Saint-Amant, Marc Antoine Gerard, Sieur de, a French writer of bacchanalian verses; born in Rouen, France, in 1594. He wrote "Moses Saved" (1653), an epic of the school of Tasso; and a number of short miscellaneous poems, among which those on bacchanalian scenes are the best—"The Revel" is one of the most remarkable of convivial poems. He died in Paris in 1660.

St. Andrews, a town of Scotland; on a rocky plateau at the edge of St. Andrews Bay, 42 miles N. N. E. of Edinburgh. From the number and nature of the remains of ancient burial found in and around the city there can be little doubt that there was a settlement here in early prehistoric times. The monkish legend, long discredited, assigned its ecclesiastical origin to St. Regulus or Rule, who, warned in a dream, brought certain bones of St. Andrew from Patras in the 4th century, and was wrecked at Muckros, afterward called Kilrimont, now St. Andrews. There is, however, reason for believing not only that those relics were brought in the 8th century, but that, before the end of the 6th, Cainnech, or Kenneth, the patron saint of Kilkenny, had founded a monastery at Rig-Monadh, the Royal Mount, and that thus arose the name of Kilrimont. Early in the 10th century it seemingly became the seat of the high bishop of the Scotch; and in Queen Margaret's time he began to be called the Bishop of St. Andrews. The Augustinian Priory, founded in 1144, was the richest and greatest of all the religious houses of Scotland. The cathedral, founded in or about 1160, and consecrated in 1318, was stripped of its images and ornaments in 1559, and afterward fell into ruin. The extreme length inside is 355 feet, but at one time it had

Saint Arnaud

been several bays longer. The bishop's palace or castle, first built in 1200, was frequently demolished and rebuilt, and is now a ruin. George Wishart and other martyrs were confined in its dungeon, and Cardinal Beaton was slain within its walls. None of the ruins is less imposing or more interesting than the foundations on the Kirkhill—the site of the Celtic church. St. Rule's Tower has probably occasioned more discussion and perplexed more archæologists than any other building in Scotland. Its arches, as well as that of its roofless chapel, approach the horseshoe in form. The parish church, which was almost entirely rebuilt in 1798, was founded in 1412. Its predecessor, which stood near the cathedral, was built three centuries earlier. Of the Black Friars Monastery a portion of the chapel remains; but of the Grey Friars almost nothing. The schools of St. Andrews were noted in 1120; but the university, the first in Scotland, only dates from 1411. The average attendance of students is about 200; but much is also being done for the higher education of women. The library contains over 100,000 volumes, and there is a good museum. The parish church of St. Leonard's is roofless, and the congregation worships in the fine chapel of St. Salvador's. The Madras College, founded and endowed by Dr. Bell, has been remodelled and placed under a new governing body. The town was erected into a free burgh between 1144 and 1153. The manufacture of golf clubs and balls is naturally a thriving industry, St. Andrews being known all over the world as the headquarters of golf. It is a popular watering place and summer resort. Pop. (1901) 7,621.

St. Ann. See ANN, ST.

Saint Arnaud, Jacques Leroy de, a French marshal; born in Bordeaux, Aug. 20, 1796. He entered the army in 1815, but left it in 1822 to take part in the Greek struggle for independence. Returning to the French army in 1831, he six years later proceeded to join the foreign legion in North Africa, and laid the foundation of his reputation in the wars against the native tribes during the next 10 years. In 1847 he was made a general of brigade; and in the early part of 1851 he carried on a bloody but successful warfare with the Kabyles. Louis Napoleon, plotting the overthrow of the republic, was at this time on the lookout for resolute and unscrupulous accomplices; and he recalled General Saint Arnaud and appointed him to the command of the second division of the city forces. On Oct. 26 Saint Arnaud became war minister, and took an active part in the arrangements for the coup d'état of Dec. 2, and in the subsequent massacres at the barricades. For these services he was rewarded with the marshal's baton. On the breaking out of the Crimean

War in 1854 he was intrusted with the command of the French forces, and coöperated with Lord Raglan in the battle of the Alma, Sept. 20. But nine days afterward he died on board ship, on his way home to France, Sept. 29, 1854.

St. Asaph, a cathedral city of Flintshire, North Wales, on an eminence between the Elwy and Clwyd, 6 miles S. S. E. of Rhyl. The cathedral, 182 feet long, is the smallest in the kingdom, and, rebuilt after 1284, is a plain, cruciform, red sandstone structure, mainly Decorated in style, with a massive central tower 93 feet high, fine oak stalls; and a tablet to Mrs. Hemans, who lived here in 1809-1828. It was restored by Scott in 1867-1875. St. Kentigern is said to have founded about 560 a bishopric at Llanelwy, renamed St. Asaph after his favorite disciple. Among 65 bishops since 1143 have been Reginald Pecock; W. Morgan, the first translator of the Bible into Welsh; Isaac Barrow the elder, on whose monument is a request for prayers for his soul; W. Lloyd, one of the Seven Bishops; Thomas Tanner; and S. Horsley. St. Asaph has a grammar school, founded about 1600, and rebuilt in 1882.

Saint Aubain, Nicolai de. See BERNHARD, KARL.

St. Augustine, a city, port of entry, and county-seat of St. John co., Fla.; on the Matanzas river, near the Atlantic Ocean, and on the St. Augustine and South Beach, and the Florida East Coast railroads; 36 miles S. of Jacksonville. It occupies a peninsula formed by the Matanzas river on the E. and the St. Sebastian river on the S. and W. Directly in front is Anastasia Island, forming a breakwater. Here are the State Institute for the Blind, Deaf, and Dumb, the Sisters of St. Joseph and St. Mary's Convents, Wilson Public Library, United States barracks, United States government building, the great Ponce de Leon, Cordova, and Alcazar hotels, and two newspapers. The chief industries are the manufacture of cigars and palmetto straw goods. The city, however, is principally of importance as a winter resort. The climate is mild and equable, there being only a few days in winter when invalids cannot take regular out-door exercise. The gardens and squares are full of palmettoes, Spanish daggers, orange and citron trees, date palms, magnolia, and bananas. St. Augustine is the oldest town in the United States, a fort having been built here by the Spaniards in 1565. As early as 1512 Ponce de Leon landed near the site of the city. In 1763 it became a British possession, and during the Revolutionary War was an important military depot. Later it again passed into the hands of Spain, and was ceded to the United States in 1821. The assessed property

valuation is over \$1,500,000. Pop. (1890) 4,742; (1900) 4,272; (1910) 5,494.

St. Bartholomew, or St. Barthélemy, a French West Indian island, 190 miles E. of Porto Rico; area, 8 square miles. The treeless surface rises to 1,003 feet; the climate is very dry. French from 1648 till 1784, the island then was Swedish till 1877, when it was bought back by France for \$80,000.

St. Bartholomew, Massacre of, a massacre of the Huguenots which took place in Paris, France, beginning on the night of Aug. 23-24 (St. Bartholomew's day), 1572. A large number of prominent Huguenots had been invited to the royal palace to participate in the wedding festivities of Henry of Navarre. While these guests were in the palace they were slaughtered without mercy, and at a signal the massacre quickly spread over the city. The anti-Huguenot leaders were Charles IX., the queen-mother Catharine de Medici, and the Duke of Guise. It has been said that the queen-mother instigated the king to his fatal persecution of the Huguenots. Coligny was the principal victim of the St. Bartholomew massacre, probably as much for political as for religious reasons. The massacre spread over France and about 30,000 lives were lost. A religious war immediately followed. It is disputed whether the massacre was deliberately planned or was the sudden result of the discovery of Huguenot plots, though the evidence points largely to the former.

St. Bernard. See BERNARD, GREAT ST.; BERNARD, LITTLE ST.

St. Bernard of Clairvaux. See BERNARD ST.

St. Bernard Dog. See BERNARD DOG, GREAT ST.

St. Bonaventura. See BONAVENTURA, ST.

St. Brieuc, a town of Brittany, France; capital of the department of Côtes du Nord; on the Gouet, 2 miles from its mouth in the English Channel, and 93 E. of Brest. It has a port, Le Légué, at the river's mouth.

St. Catharines, a city and capital of Lincoln co., Ont., Canada; on the Welland canal, and the Welland, the Niagara Central, and the Grand Trunk railroads; 12 miles N. W. of Niagara Falls. Here are a Collegiate Institute, Bishop Ridley College, a convent, numerous churches, General and Marine Hospitals, waterworks, gas and electric lights, celebrated mineral springs, several branch banks, and a number of daily and weekly newspapers. St. Catharines is the center of the fruit trade of Ontario. It has numerous canning factories, flour mills, machine shops, planing mills, breweries, woolen mills, wheel works, tanneries, hair-cloth factories, etc. Pop. (1901) 9,946.

St. Charles, a city and county-seat of St. Charles co., Mo.; on the Missouri river,

and on the Burlington Route, the St. Louis, Kansas City, and Northern, the Wabash, and the Missouri, Kansas, and Texas railroads; 22 miles W. of St. Louis. It contains Lindenwood Female College, St. Charles College (M. E. S.), the Convent of the Sacred Heart, electric lights, St. Charles Borromeo and St. Charles Libraries, National and savings banks, and a number of daily and weekly newspapers. An iron railroad and highway bridge built at a cost of \$1,750,000 crosses the river here. In the vicinity are several quarries of limestone. The city has a woolen factory, a large bridge-building plant, flour mills, manufactures of railroad cars, and an assessed property valuation of about \$2,000,000. Pop. (1900) 7,982; (1910) 9,437.

St. Christopher. See KITT'S, St.

St. Clair, a lake in North America, between Lake Huron and Lake Erie, and connected with the former by St. Clair river, with the latter by Detroit river. It is 30 miles long, greatest breadth 24 miles, area 360 square miles. It contains several fine islands. The river St. Clair, which separates Canada and the United States, is about 40 miles long, 1 mile wide, and navigable.

St. Clair, Arthur, an American military officer; born in Thurso, Scotland, in 1734. He was at Louisburg in 1758 and Quebec in 1759; engaged in the battles of Trenton and Princeton; was in command in 1777 at Ticonderoga, which Burgoyne forced him to evacuate; was at the battle of Yorktown; president of Congress in 1787; governor of Northwest Territory in 1789-1802. The expeditionary force against the Miami Indians, numbering 1,400, commanded by him, was cut to pieces near Miami village in 1791. He resigned his command in 1792; published an account of the Miami expedition in 1812; and died near Greensburg, Pa., Aug. 31, 1818.

St. Cloud, a city and county-seat of Stearns co., Minn.; on the Mississippi river, and on the St. Paul and Pacific, the Northern Pacific, and the Great Northern railroads; 75 miles N. W. of St. Paul. It contains the Minnesota State Reformatory, a State Normal School, hospital, public library, waterworks, street railroad and electric light plants, National and private banks, and two daily newspapers. It has novelty works, manufactures of lumber and wagons, flour mills, foundry, several granite quarries, the Great Northern railroad car shops, and large grain interests, and an assessed property valuation of over \$2,000,000. Pop. (1890) 7,686; (1900) 8,663; (1910) 10,600.

St. Cloud, a town of France, in the department of Seine-et-Oise; on an eminence near the Seine, 10 miles W. of Paris. Henry

III. was assassinated here in 1589 by the fanatical monk Jacques Clément. St. Cloud was long famous on account of its magnificent château, built by Louis XIV.'s brother, the Duke of Orleans. Napoleon planned and carried out here the *coup* of 18th Brumaire, and after he became emperor made this château his favorite place of residence. It was destroyed, and its magnificent park (in which stands the Sèvres porcelain factory) greatly injured, during the siege of Paris in 1870. Pop. (1901) 7,195.

St. Croix, an American river, called also the Passamaquoddy and the Schoodic, which, flowing out of Grand Lake, on the E. border of Maine, runs S. E. 75 miles to Passamaquoddy Bay, and forms a portion of the boundary between the United States and New Brunswick.

St. Croix, one of the West Indian islands, belonging to Denmark, 40 miles S. S. E. of St. Thomas; area, 74 square miles; pop. 18,430. The W. portion is hilly, but the soil almost throughout the island is productive. Sugar is the principal crop, which is, however, diminishing. The island was discovered by Columbus, and in 1902 was sought to be acquired by purchase, with the entire group, by the United States, but Denmark rejected the treaty.

St. Cuthbert, an English bishop; born near Melrose, England; early in the 7th century. He was successively prior of the monasteries of Melrose and Lindisfarne, retired afterward to the lone and desolate isle of Farne, where he might enjoy a life of solitude. He finally yielded to the persuasion of the Northumbrian king, Oswy, and took the bishopric of the province of Lindisfarne. He held this office for two years, when, worn out by labors and austerities, he died in the island of Farne, March 20, 687, which day is observed for his festival.

St. Cyril of Alexandria, an Egyptian bishop; born in Alexandria, Egypt, about 376. He succeeded his uncle Theophilus as Bishop of Alexandria in 412. He compelled the Novatians to silence, banished the Jews, and caused Nestorius to be condemned and deposed by the Council of Ephesus. A subsequent *ex parte* council of 42 bishops, headed by John, patriarch of Antioch, and favoring Nestorius, excommunicated and deposed his opponent. The emperor, appealed to in this strait, condemned both sides, and ordered the rival champions to be imprisoned. The powerful intercession of Rome, however, caused this sentence against Cyril to be abrogated. His works, mostly controversial, have been published, Paris, 1638, in seven volumes, folio. He died in Alexandria in June, 444.

St. Cyril of Jerusalem, a Church father; born in or near Jerusalem, Palestine, about

St. David

315. He was elected bishop of his native city in 351. He was soon engaged in hot conflict with his metropolitans, the Arian bishop Acacius of Cæsarea, who caused him to be twice deposed. He was for the second time restored to his episcopate in 383. Soon after, his old enemy Acacius died, but Cyril was immediately involved in new difficulties. After considerable strife Cyril was banished by order of the Emperor Valens in 367; nor did he return till the emperor's death in 378. His writings, mostly doctrinal, are extremely valuable, not on account of their vigor, profundity, or beauty, but on account of their theology. They present to us, in a more complete and systematic manner than the writings of any other father, the creed of the Church. Their style is simple and unattractive. He died in 386.

St. David. See DAVID I.

St. David, Fort, a ruined defensive work on the coast of Madras presidency, British India; 100 miles S. of Madras, on the outskirts of Cuddalore. It became British in 1690, along with all the land round about to the distance of a "randome shott," and was an important place during the struggle with the French, forming the chief of the English settlements on the Coromandel coast from 1746 to 1752. It is of interest also from associations with Clive, who became governor in 1756.

St. Davids, a village in Pembrokeshire, South Wales, on the rivulet Alan, within $1\frac{1}{2}$ miles of St. Brides Bay and 16 miles W. N. W. of Haverfordwest station. The ancient Menevia, it is now a very small place; but in the Middle Ages its cathedral, with the shrine of its founder, St. David, the patron saint of Wales, attracted many pilgrims, among them the Conqueror, Henry II., Edward I. and Queen Eleanor. Rebuilt between 1180 and 1522 that cathedral is a cruciform pile, measuring 298 feet by 120 across the transepts, with a central tower 116 feet high. Special features are the base of St. David's shrine, the tomb of Edmund Tudor, Henry VII.'s father, and the mosaics by Salviati. Little is known of the British bishops after St. David's death in 601; of the 72 since 1115 may be mentioned Archbishops Thoresby and Chichely, Barlow, Ferrar the Marian martyr, Middleton the forger, Archbishop Laud, Mainwaring, Bull, Lowth, Horsley, and Thirlwall. N. of the cathedral is the ruined college of St. Mary (1377), with a slender tower 70 feet high; and across the Alan are the stately remains of Bishop Gower's palace (1342).

St. Denis. See DENIS, ST.

St. Dié, a town of France, department of the Vosges; on the Meurthe, 50 miles S. E. of Nancy. It has a Romanesque-Gothic cathedral, a large seminary, and a museum, and carries on energetically the weaving of

Sainte-Beuve

cotton, the making of hosiery, paper, machinery, and iron goods. It is a convenient point from which to make excursions into the Vosges Mountains.

St. Dismas. See DISMAS, ST.

St. Dizier, a town of France, department of Haute-Marne, 38 miles S. E. of Châlons, on the Marne, which here begins to be navigable. In 1544 it resisted for some weeks the army of Charles V., and in 1814 the French twice defeated here the invading army of the allies. There are iron forges and foundries, boat-building yards, and cotton factories.

St. Domingo. See SANTO DOMINGO.

St. Dominic. See DOMINIC, SAINT.

Sainte-Beuve, Charles Augustin, a French writer, and one of the greatest of modern critics; born in Boulogne, France, in 1804. He

studied medicine at Paris, but abandoned that science in favor of literature, his first work of importance being on the French literature of the 16th century. His contributions to the "Revue des Deux Mondes" on French authors and literature formed



CHARLES A. SAINTE-BEUVE.

for a considerable period the chief attraction of that periodical. In 1837 he delivered some lectures in the School of Port Royal at Lausanne, and these laid the foundation of his elaborate work, "History of Port Royal." In 1840 he was appointed conservator of the Mazarin Library, and in 1845 admitted a member of the French Academy. After 1848 he contributed a number of critiques to the Monday numbers of the "Constitutionnel" and then of the "Moniteur" ("Monday Talks," 15 vols.; "New Mondays," 13 vols.). In 1852 he was appointed Professor of Latin Poetry in the College of France, but his views in favor of Napoleon III. and imperialism rendered him unacceptable to a large section of the students, and he resigned; he also lectured for some years on French literature at the École Normale Supérieure. The cross of the Legion of Honor was bestowed on him in 1859, and the senatorship in 1865. Most of his critical writings have been republished in various editions. He also wrote three volumes of poetry (1829-1837), under the pseudonym "Joseph Delorme," but these do not rank high, though his ideal of poetry

was of the very highest. He died in Paris in 1869.

Sainte=Claire Deville, Henri Etienne, a French chemist; born in St. Thomas, W. I., March 11, 1818; was educated in Paris, France. In 1844 he was commissioned to organize the Faculty of Sciences at Besançon, and in 1851 obtained the chair of chemistry in the Normal School at Paris, and shortly afterward the similar chair at the Sorbonne. He began his work as a chemical investigator by inquiring into the composition of certain resins, but soon transferred his energies to the investigation of metallurgic substances. It was he who first produced aluminum (1855) and platinum in commercial quantities, and demonstrated the general theory of the dissociation of chemical compounds at a high temperature. He discovered (1849) anhydrous nitric acid; examined the forms of boron and silicon; devised methods for fusing platinum, iridium, cobalt, etc.; determined the density of metallic vapors at exceedingly high temperatures; produced artificially sapphire, aluminium, and similar substances; and invented a way of getting crystallized oxides. His labors for producing globules of aluminium, which he exhibited at the Paris Exhibition of 1855, were in continuation of Wöhler's, dating from 1827. The platinum metals he studied along with Debray. His papers were published in the "Reports" of the Academy of Sciences, and in "Annals of Chemistry." He also published "On Aluminium" (1859); and "Metallurgy of Platinum" (1863). He died in Paris, France, July 1, 1881.

St. Elias, Mount. See ELIAS, SAINT.

St. Elizabeth. See ELIZABETH, SAINT.

St. Elmo's Fire, a peculiar electrical phenomenon. Just preceding a storm the atmosphere often becomes charged with electricity which flows from the clouds. This makes itself visible in small, brush-like flames appearing on the sharp edges or points of different bodies. At sea, where it is a very common occurrence, it has been regarded by sailors with superstitious awe and dread from the earliest times. Lieutenant Bassett, in his "Legends and Superstitions of the Sea," says: "None of the tales told of ghostly shapes or shadowy lands in the ocean world have found so many credulous believers as those of the ghostly lights that burn about the tops of the ship's spars in the heavy atmosphere preceding a storm, or in the agitated air near its close. Under various names, and connected with numerous legends, this appearance has been the joy or terror of mariners for centuries." Their earliest record in literature is in the account of the celebrated Argonautic expedition. The Romans called the lights Castor and Pollux. If one appeared, they said it was an omen of danger; if two, it

was an assurance of safety. Italian mariners of the Middle Ages regarded the light as a luminous emanation from the body of Christ, and the appearance is still called by the Portuguese *Corpo Santo*. In an account of the second voyage of Columbus we find this passage: "On Saturday, at night, the body of St. Elmo was seen, with seven lighted candles in the round top, and there followed mighty rain and frightful thunder. I mean the lights were seen which the seamen affirm to be the body of St. Elmo, and they sang litanies and prayers to him, looking on it as most certain that in these storms, when he appears, there can be no danger." In the history of the voyage of Magellan there is mention of the appearance of three brilliant lights on the masts of the ship, which instantly quelled a storm. The sailors called them the three holy bodies, St. Anselmo, St. Ursula and St. Clare. Fournier, a writer of the 17th century, relates many curious stories of this light. It was named, he says, after a saint, familiarly known as Saint Telme, but who was San Pedro Gonzales de Tuy, in Galicia, who had been a mariner, then was canonized, and became a patron saint of sailors. Galician sailors called the light San Pedro Gonzales. The phenomenon also has been known by the name of St. Hermes, St. Ermyn, St. Helen, St. Nicholas, St. Peter, St. Anne, or, indeed, by that of any one of a hundred other saints.

From the term *corpo santo*, the appearance came to have the name *corposant*, varied also by the ignorant mariners of various nationalities to *cormozant*, *comazant*, and *ampizant*. One of the curious facts about it is that it is variously regarded as a portent of good or evil, without any apparent coherence or consistency. In modern Greece the appearance is called *Telonia*, the word meaning, primarily, a demon tax-gatherer, from an old Christian superstition that demons hindered souls in their heavenward journey to gather toll. Hence the light is regarded as a bad omen, and prayer and incense are used against it. In Germany the rising of the light is a good omen, its falling a bad one. The idea that it is a spirit of some one who has died on board the ship is a very common one, even to this day. Macaulay, in the "Battle of Lake Regillus," embodies one belief concerning the lights:

"Safe comes the ship to haven
Through billows and through gales,
If once the great twin brethren
Sit shining on the sails."

And Longfellow, in "Golden Legend," gives another:

"Last night I saw St. Elmo's stars
With their glimmering lanterns all at play,
On the tops of the masts and the tops of the spars,
And I knew we should have foul weather to-day."

Saintes

As to the legends of St. Elmo himself, Mrs. Jameson says he is identical with St. Erasmus, who is shown in early art with a lighted taper on his head. An Italian writer says that he was St. Ermo, that he was buried at Gaeta, and his tomb was venerated by mariners two centuries ago. Another writer says that he was a Sicilian bishop, who, when at sea in a storm, was taken very ill. He promised the distressed mariners, in dying, that he would appear if they were destined to be saved. After his death a light appeared at the mast head and was named for him.

Saintes, an old town of France, department of Charente-Inférieure, on the left bank of the Charente, 28 miles S. E. of Rochefort. It has manufactures of iron and copper goods, machinery, and leather. In ancient times this town, under the name of Mediolanum, was the capital of the Santones, from whom the subsequent province derived the name of Saintonge. Its interesting Roman remains include a triumphal arch and the ruins of an amphitheater. It was a bishop's seat down to 1790; the cathedral still stands. Palissy's home was at Saintes during the first 50 years or so of his life. Pop. (1901) 18,219.

St. Etienne, one of the most important industrial towns in France, in the department of Loire, on a tributary of the Loire, 36 miles S. W. of Lyons and 312 S. S. E. of Paris. It is built in the midst of the second largest coal field of France, in which about 17,000 men are employed, and from which 3,000,000 tons of coal are extracted annually. The town has a school of mines (1816), a national small arms factory (1764), a gallery of art, an artillery and a commercial museum. The chief industries are in iron and steel and in ribbons. Its hardware workshops employ more than 20,000 workpeople, and turn out steel and iron plates, gun armor, iron masts, large castings for machinery, firearms, locks, cutlery, files, nails, tools, etc. The government small arms factory has since the period of the Revolution supplied nearly all the muskets and rifles and revolvers for the army. About 40,000 persons, mostly hand workers in their own homes, are engaged in the town and its vicinity in making ribbons, laces, fringes, and similar ornamental work. The production of ribbons is valued at \$18,800,000 a year, and of this about \$13,700,000 worth is exported. Besides these branches of industry, hats, pottery, and hemp cables are made. The coal mines began to be worked in the 14th century, but only on an extensive scale in the end of the 18th. The town was twice captured by the Huguenots, in 1563 and 1570, and between this last date and 1629 it suffered terribly on three occasions from the plague. The first railways in France were built

St. Gall

from St. Étienne, one in 1828 to Andrezieu, the other in 1831 to Lyons. Pop. (1906) 146,788.

Saint-Evremond, Charles Marguetel de Saint-Denis, Seigneur de, a French writer; born in 1613. At 16 he entered the army, took part in many of the campaigns of the period, and rose to the rank of Field-Marshal, but gained his chief laurels in the salon of Ninon de l'Enclos as a brilliant conversationalist and a graceful wit. He was a staunch royalist, but, compromised by the disgrace of Fouquet, and afraid of Mazarin, he fled to England in 1661, and was welcomed and pensioned by Charles II. He was buried in Westminster Abbey. His satirical writings and his letters are of most interest. One of the former is his "Comedy of the Academicians." He died in 1703.

St. Francis, a river of the United States, forming part of the boundary between Arkansas and Missouri, and entering the Mississippi. At high water it is navigable for about 150 miles; total length 450.

St. Francis de Sales. See FRANCIS DE SALES, ST.

St. Francis of Paola. See FRANCESCO DI PAULA.

St. Frederick, Fort, one of the Revolutionary fortifications of Crown Point, N. Y.

St. Frideswide. See FRIDESWIDE, ST.

St. Gall, the capital of the Swiss canton of the same name; on the Steinach; 2,196 feet above sea-level (the highest town in Europe), 53 miles E. of Zurich, and 9 from Rorschach on the Lake of Constance. The buildings of its famous Benedictine monastery are now used as government offices and schools, and for housing the monastic library, founded in 830, of 41,700 volumes and 1,800 MSS., several of these last of great antiquity and value. Other buildings are the old abbey church, thoroughly restored in 1756-1766, and made a cathedral in 1846; the Protestant Church of St. Lawrence (restored 1851-1853); the town library, founded in 1536, and containing 60,400 volumes and 500 MSS.; and the museum with collections of natural history, works of art, and antiquities. The city carries on a large trade in its staple commodity, embroidered textiles (cotton, muslin, etc.), and in agricultural products. The original nucleus of the place was the cell of St. Gall (about 550-645), an Irish follower of St. Columban, who settled here in 614. Around this soon grew up a monastery of the Benedictine order, which was promoted by Charles Martel to the dignity of an abbey. The abbey gradually became one of the masterpieces of mediæval architecture; while the monks were indefatigable in the collection and transcription of MSS. — Biblical, patristic, historical (sacred and profane), classical, liturgical, and legend-

St. Gaudens

ary. Several of the classics, especially Quintilian, Silius Italicus, and Ammianus Marcellinus, have been preserved solely through the MSS. of St. Gall. Its monastic schools enjoyed the greatest reputation for learning from the 9th to the 12th century. Among its more distinguished pupils were Notker and Ekkehard. They were noted also for the cultivation of music (Notker Labeo being the chief ornament), and its MSS., preserved in the library, have been extensively made use of by the restorers of ancient ecclesiastical music. By the 10th century a walled town had grown up around the monastery. After long struggles the townsmen succeeded, in the 13th century, in throwing off the supremacy of the abbey, though shortly before this the abbots were elevated to the rank of princes of the empire. In 1454 the town was admitted to the Swiss confederation, and in 1528, through the influence of the reformer Vadianus, it embraced the new doctrines. At the close, however, of the religious war, in 1531 the Catholic religion was reestablished, and the abbot reinstated. At the French Revolution the abbey was secularized (1798), and its revenues were soon afterward sequestrated (1805). By a later arrangement (1836) St. Gall was erected into a bishopric. The French republicans created the canton of Säntis out of the town and abbey lands, with others, in 1799; and in 1803 the existing canton of St. Gall was formed. Pop. (1905) 51,766.

Saint Gaudens, Augustus, an American sculptor; born in Dublin, Ireland, March 1, 1848; came to the United States in infancy; studied art at Cooper Institute, New York city, in 1861; at the National Academy of Design in 1865-1866, and at Paris, where he attended the Ecole des Beaux Arts in 1867. In 1871, while in Rome he produced his first figure, "Hiawatha," but returned to the United States in 1872. Among his works are the bas-relief, "Adoration of the Cross by Angels," statues of Admiral D. G. Farragut; Robert R. Randall, and President Lincoln; the Shaw monument in Boston, and the original Diana on the Madison Square Garden, N. Y. He assisted John La Farge in the decoration of Trinity Church, Boston, and in the modeling of the statue of Le Roy King, in Newport, R. I. He designed the Medal of Award of the Columbian Exposition, a number of presentation medals authorized by Congress and the new United States gold coins and one cent piece, and made the Parnell monument for Dublin. He died Aug. 3, 1907.

Saint-Gelais, Melin, or Merlin de, a French lyric poet; born in Angoulême, France, Nov. 3, 1487. He affected the Italian forms of poetry—the terza rima and sonnet—and was the first French poet to write madrigals. He died in Paris in 1558.

St. Gregory of Nyssa

St. Geneviève. See GENEVIÈVE, ST.

St. George. See GEORGE, ST.

St. George's Channel. See GEORGE'S CHANNEL, ST.

St. Germain-des-Prés, named from Germanus of Paris; a famous abbey and church near Paris. The church—early Romanesque—is one of the most interesting ecclesiastical edifices in the world. Its walls were frescoed by J. H. Flandrin.

St. Germain-en-Laye. See GERMAIN-EN-LAYE, ST.

St. Gilles. See GILLES, ST.

St. Goar, a fortified town of Prussia, 15 miles from Coblenz. It is on the W. bank of the Rhine, under the stupendous rock and castle of Rheinfels, with which it surrendered to the French in 1794. On the opposite side of the river is the smaller town of St. Goarshausen, and on a mountain near it is the strong castle called Katz. St. Goar has a considerable trade in wines and hides.

St. Gotthard, a mountain knot of the Alps, in the Swiss cantons of Uri, Grisons, Ticino, and Valais, 9,850 feet high. In its arms it holds the sources of the Rhine, Rhone, Ticino, Reuss rivers, and so sends the water from its melted snows to the German Ocean, the Mediterranean, and the Adriatic. On its shoulder it bears one of the most celebrated of the Alpine passes from Switzerland to Italy. The road that crosses this pass (6,936 feet) leads from the shores of Lake Lucerne to the shores of Lago Maggiore. This route was first used by the Longobardi in the 6th century. In the days of Charlemagne the path was made practicable for pack animals; but down to 1820 it was not wider than 13 feet. In 1820-1824 it was widened to 18 feet and smoothed for carriages. Near the summit of the pass stand two hotels and a hospice, the latter for poor wayfarers, of whom some 12,000 used to travel this way every year. Since 1882, however, a railway has climbed up the lower slopes of the St. Gotthard, and then burrowed through it in a tunnel. The making of this tunnel was begun in 1872 and finished in 1880; it extends from Göschenen (at a height of 3,639 feet) in Uri to Airolo (3,757 feet) in Ticino, measures 9¼ miles in length, is 26 feet wide, and 21 high, rises with a gradient that reaches on an average 26 in 100 feet, and cost \$11,350,000 to make. The total cost of the St. Gotthard railway was \$45,400,000. The line has proved very successful financially.

St. Gregory. See GREGORY, ST.

St. Gregory II. See GREGORY.

St. Gregory Nazianzen. See GREGORY NAZIANZEN, ST.

St. Gregory of Nyssa. See GREGORY OF NYSSA, ST.

St. Helena

St. Helena. See HELENA, ST.

St. Helena, an island of South Carolina, in St. Helena sound, Beaufort county; comprising the township of the same name; about 13 miles in length; noted for its production of sea-island cotton; has churches, schools, and a population (1900) of 8,819, chiefly engaged in cotton growing.

St. Helens, a town of Lancashire, England, on the Sankey brook; 12 miles E. N. E. of Liverpool and 21 W. by S. of Manchester. Thanks to its railway and canal facilities, and to the immediate neighborhood of coal, it has grown within recent years from quite a small village to an important industrial center, and now is the great seat of the manufacture of crown, plate, and sheet glass and also possesses extensive alkali, copper smelting, and iron works. It was constituted a municipal borough in 1868; a parliamentary borough in 1885; and a county borough in 1888. The handsome town hall, with a public library, was opened in 1876. Pop. (1901) 84,410.

St. Helen's Island, a beautiful island in the St. Lawrence river, opposite the E. end of the city of Montreal; formerly the property of the Barons of Longueuil, but now of the Crown; about three-quarters of a mile long by a third of a mile broad; containing many handsome trees. The island was granted by the King of France to the Sieur le Moine de Longueuil, Nov. 3, 1672, and was purchased with Isle Ronde and Isle aux Fraises, by the British Government for £15,000 in 1812. The grand baronial residence, a large stone edifice with outbuildings and a spacious garden, was converted into officers' quarters, and the entire island was gradually transformed into a military post, as an important part of the defenses of the city. It has a magazine capable of storing 6,000 barrels of powder, an ordnance storehouse of large dimensions, an armory that will accommodate 40,000 stand of arms, a rifle range, infantry barracks, a practice battery, and remains of the old French redoubt. Of late the city of Montreal has converted the island into a magnificent park.

St. Helen's Mountain, a volcanic peak of the Cascade range, at the N. W. angle of Skamania co., Wash.; height, about 13,400 feet.

St. Helier, the capital of the island of Jersey; on the S. shore of the island, and the E. side of St. Aubin Bay. It is defended by Elizabeth Castle (1551-1586), on a rocky island off the shore, approached by a causeway at low water; and by Fort Regent, on the S. E. side of the town; built in 1806-1815 on a scarped granite rock, at a cost of \$5,000,000. Victoria College (1852) is a handsome edifice; and one may also notice the court house (1647), the public library (1736), a gilt statue of George II. (1751),

St. James's Palace

and the harbor, forming an outer and inner basin. An active trade is carried on with England, France, and India. Pop. (1901) 13,906. See JERSEY.

St. Henri, a city (incorporated in 1876), in Hochelaga county, Montreal district, Quebec, Canada; on the Lachine canal and the Grand Trunk railway; adjoining the city of Montreal. It has numerous churches, schools, hotels, branch banks, and manufactories, and is lighted by electricity. Pop. (1901) 21,192.

Saint-Hilaire, Augustin François Cesar Provensal de, called AUGUSTE DE SAINT-HILAIRE, a French botanist; born in Orléans, France, Oct. 4, 1799; wrote: "Flora of Southern Brazil," and a series of four works, which included his travels, under the general title of "Journey in the Interior of Brazil," and issued in eight volumes, at intervals from 1830 till 1851. He traveled extensively in the S. and interior provinces of Brazil from 1816 till 1822. He died in Orléans, Sept. 30, 1853.

Saint Hilaire, Marco de, pseudonym of EMILE MARC HILAIRE, a French miscellaneous writer; born about 1796. A literary trifler of small success, he later adopted the line of glorifying Napoleon as the hero of democracy, and contributed in no small degree to foster "Napoleonic ideas" and to prepare the way for the second empire. Among his works of this kind are: "Recollections of the Private Life of Napoleon" (1838); "The Emperor's Aides-de-Camp" (1841); "Popular History of Napoleon" (1842); "History of the Russian Campaign" (1846-1848). He died Nov. 5, 1887.

Saintine, originally JOSEPH XAVIER BONIFACE, a French littérateur and dramatist; born in Paris, France, July 10, 1798. He wrote about 200 plays. His story "Picciola" ran through 40 editions. He died in Paris, Jan. 21, 1865.

St. Ives, a seaport and watering place in England, on St. Ives Bay, on the N. coast of Cornwall; 57 miles W. S. W. of Plymouth. It is a popular winter resort, has an extensive pilchard fishery, and exports large quantities of tin, copper, and slate. Its harbor is protected by a pier built in 1770. It has beautiful churches, a few pretty dissenting chapels, a custom house, and other public buildings, including a literary institution. Pop. about 7,000.

St. James's Palace, a palace in London, England. Originally a hospital dedicated to St. James, it was reconstructed and made a manor by Henry VIII., who also annexed to it a park, which he enclosed with a brick wall, to connect St. James's with Whitehall. The gateway and clock tower are from designs by Holbein. Here Queen Mary died (1558); Charles I. slept

here the night before his execution; and here Charles II., the Old Pretender, and George IV. were born. When Whitehall was burned in 1697, St. James's became the regular London residence of the British sovereigns, and it continued to be so till Queen Victoria's time. Additions and improvements, gradually made, have totally changed the original palace, so that at the present time little, if any, of the old structure remains. In 1837 the royal household was transferred to Buckingham Palace, whither the drawing rooms were also removed at the death of the prince consort, and St. James's was used only for levees. The Court of St. James's is a frequent designation of the British court. St. James's park lies S. of the palace, and extends over 58 acres.

St. John, a city of New Brunswick, Canada, the county-seat of St. John co.; on the St. John river, at its entrance into the bay of Fundy, and on the Intercolonial, the Shore Line, and the Canadian Pacific railways, 481 miles E. of Montreal and 190 miles N. W. of Halifax. It is the chief city of the province, the Atlantic terminus of the Canadian Pacific railway, one of the Atlantic termini of the Intercolonial railway, and was selected as one of the Atlantic termini of the Grand Trunk Pacific railway which was under construction in 1907. It is a seaport with an excellent harbor, protected by a breakwater 2,250 feet long on the E., and by a beacon light on Partridge Island at the harbor entrance. There is a quarantine hospital on this island. The tides here rise and fall from 25 to 35 feet every day. The city is built on rising ground, the elevated portion consisting wholly of solid rock, which in numerous places has been excavated to a considerable depth for new streets. The elevated peninsula on which the larger portion of the city is built has Courtenay bay to the E. and the harbor to the W. On the W. side of the harbor is St. John West, and beyond it the suburb of Fairville. The area of St. John is about 6,000 acres.

Buildings and Institutions. — Among the noteworthy public buildings are the post office, custom house, city hall, union station, Odd Fellows' and Masonic halls, public library, opera house, Mechanics' Institute, provincial insane asylum, General Public Hospital, Sailors' Home, Young Men's Christian Association building, Home for Aged Females, Reformatory for Boys, Wiggins Orphan Asylum for Sailors' Sons, Protestant and Roman Catholic orphan asylums, Canadian Bank of Commerce, and the Dominion Savings Bank. Rockwood park has an area of 250 acres. Of the two large squares, Queen's and King's, the latter contains a small but elegant park. There are 40 churches, representing 10 denominations. Of the churches the finest from an

architectural point of view are Trinity Church (Anglican), Roman Catholic cathedral, St. Andrew's Church (Presbyterian), Queen's Square and Centenary churches (Methodist), and the Baptist Church on Germain street.

The educational institutions include the Centennial, Albert, and Victoria schools, the Madras School, Mount Pleasant Convent School (Roman Catholic), and Davenport School for Boys (Anglican). There are also high and public schools. The principal charitable institutions are those whose buildings are mentioned above. There are 6 leading hotels, 11 banks and branches, and 5 daily and several weekly newspapers.

Industry and Commerce.—As one of the two leading winter ports of Canada (the other being Halifax) St. John has a large trade. In addition to the railways which connect it with the leading Canadian and American cities, it has excellent steamship communication with Boston and other Atlantic coast ports, and with London, Liverpool, Manchester, Glasgow, Dublin, Belfast, continental European ports, South Africa, and the West Indies. The shipping trade is large. For the fiscal year ending June 30, 1905, the arrivals of seagoing and coasting vessels were 1,333, with a tonnage of 875,784 tons, and the clearances 1,290, with a tonnage of 683,071 tons. For the same year the exports were valued at \$13,548,041 and the imports at \$5,558,477. These exports were only Canadian products; in addition there were shipped during the winter of 1904-05 American products valued at \$13,706,877. This trade was developed chiefly during 1895-1905. The manufacturing establishments include cotton, rolling, pulp, coffee, and spice mills, sawmills, foundries, engine and boiler works, woodworking factories, edge tool works, nail factories, brass works, brush and broom factories, pork packing establishments, paper box and cigar factories, etc. According to the Dominion census returns, the value of the manufactured output for 1905 was \$7,009,698, as compared with \$6,712,769 for 1900. St. John is a very important port for shipping lumber, and in 1905 161,800,000 superficial feet of that product were shipped to transatlantic ports and 70,000,000 feet of long lumber to the United States. The city has a gravitation water supply system, 38 miles of sewers emptying into tide water that sweeps away all impurities, and more than 13 miles of street railway. The city government consists of a mayor and 15 aldermen elected annually by the people.

St. John derives its name from the river on which it is situated, which was discovered by Champlain in 1604. The history of the period between 1630 and 1713, when the region was finally ceded by France to England, under the terms of the Treaty of Utrecht, is full of romantic interest. In 1762

three New-Englanders made the first English settlement, and in 1783, at the close of the Revolutionary War, 3,000 United Empire Loyalists came to St. John from the State of New York and were the real founders of the city, which was incorporated in 1785. Pop. (1901) 40,711; local est. (1907) 50,000.

St. John, the largest river of New Brunswick, rising in the highlands in the N. of Maine, flowing N. E., and then S. E. 450 miles, and falling into the Bay of Fundy by an estuary 5 miles in width. Near the sea it is navigable for large vessels; while for craft of 120 tons it is practicable as far as Fredericton (80 miles), and for small steamers to Woodstock, 75 farther up. Through most of its upper course the stream separates Maine from Canada.

St. John. See JOHN.

St. John, Bayle, an English miscellaneous writer, son of James A.; born in London, England, Aug. 9, 1822. Among his works are: "Eccentric Love: A Novel" (1845); "Adventures in the Libyan Desert" (1849); "Views of the Oasis of Siwah" (1850); "Purple Tints of Paris" (1854); "Travels of an Arab Merchant in Sudan" (1854); "The Sub-Alpine Kingdom" (1856); "Martinetto: A Story of Adventure" (1856); "Legends of the Christian East" (1856). He died Aug. 1, 1859.

St. John, Charles Edward, an American physicist; born in Allen, Mich., March 15, 1857; was graduated at the Michigan Normal College in 1876, and studied physics abroad; was instructor of physics at the Michigan Normal College, Ypsilanti, in 1885-1892; associate professor of the same at Oberlin College in 1897-1899; and then took the chair of physics and astronomy there. He was the author of "Wave-Lengths of Electricity on Iron Wires" (1894); "A Study of *Silphium Perfoliatum* and *Dipsacus Laciniatus* in Regard to Insects" (1887); etc.

St. John, Charles William George, a British naturalist and sportsman; born in 1809. About 1834 he settled down to his favorite pursuits in the N. of Scotland, and published "Wild Sports and Natural History of the Highlands" (1846); "Tour in Sutherland" (1849), and "Notes of Natural History and Sport in Morayshire" (1863). He died in 1856.

St. John, James Augustus, an English writer; born in 1801. In 1830 he published "Journal of a Residence in Normandy"; and a journey to Egypt produced "Egypt and Mohammed Ali," "Egypt and Nubia," and "Isis, an Egyptian Pilgrimage." He was the author of a number of other miscellaneous works, including several novels. He died in 1875. His sons: BAYLE ST. JOHN (1822-1859) (*q.v.*), resided for several years

in the East, and published books on Egypt, Turkey, etc., and a biography of Montaigne; HORACE ROSCOE ST. JOHN, born in 1832, wrote works on India; and PERCY BOLINGBROKE ST. JOHN, born in 1821, traveled extensively in America, contributed fiction, notably Indian tales, to various periodicals, and was the author of over 30 novels.

St. John, John Pierce, an American lawyer; born in Brookville, Ind., Feb. 25, 1833; received a common school education; entered the Union army during the Civil War and served as captain and lieutenant-colonel; removed to Kansas after the war and was elected to the Senate of that State in 1872; was governor of Kansas in 1879-1883. He was a candidate for President of the United States on the Prohibition ticket in 1884. He later became an independent in politics, but lectured on prohibition, woman suffrage, and the free coinage of gold and silver. In 1900 he supported the Free-silver ticket.

St. John Lateran, Church of. See LATERAN, CHURCH OF ST. JOHN.

St. John-Brennon, Edward, an Irish poet; born in Dublin, Ireland, Feb. 21, 1847. He wrote: "Bianca, the Flower Girl of Bologna" (1866); "Ambrosia Amoris" (1869); "Two Gallian Laments"; "The Witch of Nemi"; "The Tribune Reflects," etc.

St. Johns, a river in Florida whose source is Lake Poinsett in Orange county. It flows N., almost parallel with the coast, and enters the Atlantic about 16 miles N. E. of Jacksonville. It is 350 miles long, and its course is winding and often tortuous through swamps dense with rank vegetation. Frequently the scenery along its banks is picturesque, mammoth trees in their living green being draped with hanging masses of feathery brownish moss. Reptiles abound in low, marshy districts through which it passes. Its N. portion flows through a higher country. It is navigable from its mouth to Enterprise.

St. John's, a city of Newfoundland, capital of the colony; situated on the E. side of Avalon peninsula, in lat. 47° 33' 3" N. and lon. 52° 45' 10" W., 562 miles N. E. of Halifax in a direct line, 600 miles by steamer, 1,070 miles from Montreal, 1,100 miles from New York, and 1,700 miles from Queens-town, Ireland, being nearer to Europe than any other port in British America or the United States. The city is built on ground that slopes upward from the N. side of a deep, spacious, landlocked harbor, a mile long and nearly half a mile wide, capable of sheltering the largest ships, and entered through the Narrows, a rock-bound channel, half a mile long and 600 feet wide at its narrowest point. The three principal streets, of which Water street is the most

St. John's

important, are parallel with the harbor. On the right side of the harbor entrance, at a height of 508 feet, rises Signal Hill, a signal-station for approaching ships, and at the left is Fort Amherst Lighthouse. Cape Spear Lighthouse is near by. On the S. side of the harbor the hill rises almost sheer above the water to a height of 650 feet, and along its base, which is connected with the opposite shore by a causeway and bridges, is a line of warehouses and oil factories. At the head of the harbor is a wooden dry dock, 600 feet long, 130 feet wide, and able to accommodate all but the very largest ocean steamers and warships afloat.

Buildings and Institutions.—The most prominent buildings are the Roman Catholic cathedral, commandingly situated on the top of the hill and overlooking the city; the Anglican cathedral, half-way up the hill, an exceptionally handsome church in the Early English style of architecture; the Parliament buildings, Government House, court house, post office (containing a museum of natural history and geology), the Methodist and Presbyterian churches, St. Bonaventure's College (Roman Catholic), the Methodist College, custom house, market house, Crosbie Hotel, St. Patrick's Hall, and Total Abstinence Society's Hall. The scenic aspect of the city is heightened by Bannerman and Victoria parks. The educational and charitable institutions, besides those above mentioned, include the Anglican and Presbyterian colleges, several convents, the lunatic asylum, the poorhouse, St. John's Athenæum, and St. Joseph's Catholic Institute. The public General Hospital and the Penitentiary are on the outskirts of the city. There are 2 theaters, 3 daily evening newspapers, the "Telegram," "Herald," and "Daily News," and 3 weeklies, the "Trade Review," "Free Press," and "News."

Commerce, Industries, Government, etc.—The city is the E. terminus of the Newfoundland railway, which traverses the island from St. John's to Port-aux-Basques, its S. W. extremity, and steamers ply to various points on the coast, to Labrador, Halifax, Montreal, Sydney (Cape Breton Island), New York, Liverpool, Glasgow, and other ports. The staple occupations are cod, seal, and lobster fishing, and whaling, and among the industrial establishments are the large fish stores in Water street, and the whale and seal oil factories on the S. side of the harbor; also foundries, machine shops, breweries, distilleries, and manufactories of leather, fishing nets, block and rope, cordage, boots and shoes, tobacco, furniture, sashes and doors, etc. There are 4 banks, besides a government savings bank, for the protection of whose depositors the general revenue of the colony is security. A United States consul resides in the city. St. John's is supplied with an electric street

St. John's Wort

car service, which traverses the main streets and makes the circuit of the city by way of the Military Road running along the crest of the ridge. The water supply is obtained by gravity.

History.—The site of the city was occupied soon after the discovery of the island by John Cabot in 1497, and slowly grew from a mere fishing village on the edge of the harbor to a town sloping upward on the hillside. In 1836 its population was 15,000. It was partly destroyed by fire in 1846, and on July 8, 1892, a disastrous conflagration swept away half of the city, including some of its finest buildings, and destroyed property valued at \$15,000,000. Contributions poured in from Canadian, English, and American cities, and the people set to work with energy to rebuild. Wider streets, better buildings, and better fire protection were the result. In 1894 a business crisis, accompanied by bank failures, was severely felt, but the effects soon passed away, and since then the city has enjoyed increasing prosperity. Pop. (1891) 25,738; (1901) 29,594; est. (1907) 35,000, almost wholly composed of English and Irish stock.

St. Johnsbury, a town and county-seat of Caledonia co., Vt.; on the Passumpsic river, and on the Portland and Ogdensburg, the Passumpsic, and the St. Johnsbury and Lake Champlain railroads; 34 miles E. N. E. of Montpelier. It contains a fine court house, St. Johnsbury Academy, St. Johnsbury Athenæum, water works, street railroad and electric light plants, National and savings banks, and two newspapers. It has foundries, machine shops, manufactories of farming implements, the widely known Fairbanks scale works, and an assessed property valuation of about \$4,000,000. Pop. (1900) 5,666; (1910) 6,695.

St. John's College, an educational non-sectarian institution in Annapolis, Md.; chartered in 1784 and opened in 1789; it was the successor of King William's School, founded in 1696; has grounds and buildings valued at over \$250,000; volumes in the library, about 12,000; ordinary income, \$60,000; average number of faculty, 15; average student attendance, 190; number of graduates, over 750.

St. John's College, also known as **Fordham University**, a Roman Catholic institution for men only in New York city; founded in 1839 by Archbishop Hughes; opened in 1841; and under the direction of the Jesuit Fathers since 1846; has grounds and buildings valued at over \$2,000,000; scientific apparatus, etc., \$130,000; volumes in the library, about 70,000; average number of faculty, 120; average student attendance, 850; graduates, over 1,200.

St. John's Wort (*Hypericum*), the typical genus of plants of the natural order

St. John's Wort

Hypericineæ. It is a numerous genus of herbs and shrubs widely distributed, both in the New and the Old World, particularly abundant in Western Asia, Southern



LARGE-FLOWERED ST. JOHN'S WORT.

Europe, and in North America; it occurs also within the tropics. The leaves are opposite entire, without stipules, often marked with glandular dots of two kinds, pellucid ones which are very apparent when the leaves are held against the light, and black ones which are usually on the under side of the leaves round the edge, or sometimes on the flowers. The flowers are regular, with five sepals, and five petals, usually yellow. They abound in a yellow resinous juice which is more or less purgative and anthelmintic. The common St. John's wort, an abundant native of Great Britain, even when slightly bruised yields copiously a yellow resinous juice, which, when rubbed between the fingers, emits a scent like lemons and stains the skin a dark purple. The plant has long been credited with powerful medicinal properties, but finds no place in the pharmacopœias, nor is it recognized by regular practitioners. It has been used as a vulnerary, both externally and internally, in chest complaints, dysentery, hemorrhages, and jaundice. In France and Germany the plant is ceremoniously gathered on St. John's Day by the common people as a charm for evil spirits, storms, and thunder; in North Wales a similar custom still exists, and in Scotland it was formerly worn as a charm on the person against all malignant influences. The leaves of *H. androsæmum* are called by the French *toute saine*, hence the English name tutsan; in both countries they were

St. Joseph

formerly used to dress fresh wounds. Other species of *Hypericum* have similar properties. There are several species, such as *H. calycinum* (also called Aaron's Beard), frequently cultivated in British gardens.

St. Joseph, a city of Missouri, the county-seat of Buchanan co.; on the E. bank of the Missouri river, and on the Burlington Route, the Atchison, Topeka, and Santa Fé, the Chicago Great Western, the Missouri Pacific, the Chicago, Rock Island, and Pacific, and the St. Joseph and Grand Island railroads; 61 miles N. W. of Kansas City. Electric railways connect it with Highland, Kans., and Savannah, Mo. A steel bridge 1,345 feet long connects it with Elwood and Wathena, its Kansas suburbs. It has an area of 9¾ square miles. The business section is along the river front, while the residential sections are on the hills. In 1907 its population was estimated at 121,000. It is the third city in the State in population.

Buildings, Education, Charities, and Clubs.—Among the notable buildings are the city hall, the Buchanan county court house, the Federal building, the Livestock Exchange and Board of Trade buildings, the centrally located Free Public Library, the Auditorium, which was nearing completion in 1907, and can admit 10,000 persons, the Central High School, the Scottish Rite and the Roman Catholic cathedrals, and the Elks club-house. The spacious Union passenger station furnishes accommodation for 132 trains daily. Krug park, the principal park of the city, has a beautiful entrance gate. There are also six smaller parks. Lake Contrary is a favorite spot for fishing, aquatic sports, and summer outings.

The city contains several educational institutions, among which may be mentioned the Ensworth Medical College, the Christian Brothers' College, and the Academy of the Sacred Heart, the last two being Roman Catholic. The municipality maintained, in 1906, 35 grade schools and 2 high schools, which employed 290 teachers. The total value of the municipal school property was estimated at \$1,100,000. The Free Public Library includes 2 modern buildings, the Carnegie branch being in the stockyards district, and contains over 40,000 volumes. There are 88 churches of various denominations, and St. Joseph is the seat of a Roman Catholic bishop. Five daily and 10 weekly newspapers are published, besides 12 monthly magazines. There are 6 theaters. The charitable institutions are numerous, the most notable being the State Lunatic Asylum, St. Joseph's Hospital, Ensworth Hospital, the Home for Little Wanderers, and the Memorial Home for Aged People.

St. Joseph is well provided with social

and business organizations. Among the former are the Elks, Benton, Country, Lotus, and numerous other clubs for golf, tennis, yachting, and boating. The business organizations are represented by the Board of Trade, the Business Men's League, the Commercial Club, the Livestock Exchange, the Manufacturers' Association, the Real Estate Exchange, the South St. Joseph Business Men's Club, the Retail Merchants' Association, and several others.

Industry and Commerce.—In the manufacturing industries, the development of St. Joseph has been steady and important. The products of its numerous establishments include: Hats and caps, overalls, shirts, blankets, trunks and leather goods, boots and shoes, tents and awnings, mattresses, furniture, pumps, plows and other agricultural implements and machinery, office and store fixtures, wooden and paper packing boxes, saddlery and harness, fence-wire, clothes and furnishing goods, cereals, crackers, and soap. The rapid growth of St. Joseph in industrial importance may be seen from the following United States Census figures:

Year	Number of Establishments	Capital	Number of Wage-Earners	Total Wages	Cost of Materials Used	Value of Products
1880	238	\$1,423,650	2,258	\$ 896,762	\$3,210,080	\$5,143,585
1890	276	5,230,697	4,579	1,970,231	7,848,353	11,916,141
1900	440	11,068,825	7,429	3,109,647	25,068,215	31,690,736

The United States Census of Manufactures for 1905 does not take account of neighborhood industries and hand trades, but confines itself to factory industries. In the case of St. Joseph it also leaves out of account the stockyards proper, in which are located the majority as well as the largest of the packing plants, and which form an integral part of St. Joseph's industrial activity, although they are located just outside of the city limits. These narrower figures, compared with the corresponding figures for 1900, are as follows:

Year	Number of Establishments	Capital	Number of Wage-Earners	Total Wages	Cost of Materials Used	Value of Products
1900	184	\$8,016,398	5,095	\$1,997,736	\$6,942,018	\$11,361,939
1905	219	9,734,073	4,663	2,071,881	6,813,697	11,573,720

The packing-house interest transcends all others in magnitude. Its rapid growth dates mainly from 1898. The number of earloads of livestock received in 1905 was 51,319, against 24,583 in 1898; the number of packing-house employees was 5,500 in

1905, against 2,375 in 1898; and the total of their wages was \$2,676,831 in 1905, against \$915,088 in 1898; the value of packing-house products was \$60,000,000 in 1905. As a packing-house center and live-stock market, St. Joseph ranks fifth among American cities, \$1,000,000 being paid out every week on its market for livestock. The receipts of cattle, hogs, and sheep increased from 29,081, 235,469, and 2,950 respectively in 1888, to 225,984, 1,034,125, and 121,707 respectively in 1898, and to 553,525, 1,908,207, and 826,764 respectively in 1906. It is also an important grain and hay market, which is operated under clearly defined rules for inspecting, weighing, and arbitration. The present elevator capacity is 700,000 bushels, with additions in contemplation. The banking facilities are ample, there being eleven National and State banks and three trust companies. The bank clearances increased from \$60,044,000 in 1896 to \$250,649,000 in 1906. The transportation facilities are unexcelled, and the freight annually received and forwarded amounts to about 2,200,000 tons. It is the trading center for a rich agricultural section, and has numerous wholesale and retail houses.

The transportation facilities within the city are ample and adequate. The street railway system is equipped with a new central power plant, and provides rapid transit to all parts of the city with free transfer privileges.

Administration and Public Interests.—The mayor and council are elected for two years, and the president of the council for four years. There is a public school enrollment of about 12,000, and the annual expenditure for education is about \$140,000. The annual cost of maintaining the city government is about \$450,000. The municipal debt amounted in 1907 to \$1,131,050. There is a perfected system of water works, with gravity pressure. The streets are lighted by electricity, and natural gas, piped from the Kansas fields, is used for fuel and lighting in the manufactories and houses.

History and Population.—In 1823 Joseph Robidoux established an Indian trading post at the foot of Blacksnake Hills, part of the Missouri river bluffs at this point. In 1843 the town was laid out and named St. Joseph. In 1846 it was made the county-seat, in 1849 became an outfitting point for emigrant wagon trains to California, and in 1851 was incorporated as a town. It was the first point on the Missouri river to have a railroad, the Hannibal and St. Joseph railroad being completed in 1859. It was the eastern terminus of the famous Pony Express, established in 1861, between California and the Missouri river. In 1885 St. Joseph obtained a new charter as a city of the second class. The first cen-

St. Joseph

sus, which was taken in December, 1846, showed a population of 936. Its growth was interrupted by the Civil War, but its location in one of the most fertile agricultural sections of the Middle West and the convergence of so many railroad systems could not fail to assure it a permanent prosperity. Its growth since 1870 has been as follows: Population (1870), 19,565; (1880), 32,431; (1890), 52,324; (1900), 102,979; (1910, census) 77,403. In 1900 the population included 6,260 negroes, making 6.1 per cent. of the total. The foreign born numbered 8,424 (8.2 per cent. of the total), the most numerous elements being 3,566 Germans and 1,241 Irish.

Revised by CHRIS. L. RUTT.

St. Joseph, a river in Michigan whose source is in Hillsdale county, and which flows into Lake Michigan at St. Joseph. Its course is very winding and nearly W. and N., curving through Elkhart co., Ind., and touching South Bend, and a few miles below that city returning to Michigan, and then flowing N. through Berrien county. It is navigable to South Bend and is 250 miles long. Another river of the same name is in Southern Michigan and passes across a part of Northwestern Ohio and Northeastern Indiana, uniting at Fort Wayne with St. Mary's river and so forming the Maumee. Its length is about 100 miles.

St. Joseph Island, an island in the outlet of Lake Superior into Lake Huron. It belongs to Ontario, Canada, is 20 miles long, 15 miles wide.

Saint-Lambert, Jean François, Marquis de, a French philosopher and poet, one of the encyclopedists; born in Nancy, Dec. 26, 1716. He won fame by his poem "The Seasons" (1796). He died in Paris, Feb. 9, 1803.

Saint-Just, Antoine Louis Léon Flor-elle de, a French revolutionist; born in Decize, Nivernais, Aug. 25, 1767. Having adopted with enthusiasm the principles of the Revolution, he became the right hand of Robespierre, and was one of the most energetic and resolute members of the Mountain party. He was an effective speaker, but unscrupulous and uncompromising in spirit. The guillotine was his general answer to all arguments and actions which did not harmonize with his own. He was returned to the Convention in 1792 by the department of Aisne, and in his first speech he declared that every Frenchman had the same right against Louis XVI. that Brutus had against Cæsar. On Feb. 19, 1794, he was made president of the Convention, and he drew up the accusations against Danton and his followers that led to their execution. He fell with Robespierre through the terrible events of the 9th Thermidor and perished

St. Lawrence Island

on the same scaffold with him on the following day, July 28, 1794.

St. Lawrence, a river of North America, forming in its upper reaches part of the N. boundary of the United States, but for the most part confined to the Canadian Dominion. It issues from Lake Ontario at Kingston, where the name begins to be applied to the river, though the remotest source of the highest feeder of its basin, the St. Louis, which enters the W. end of Lake Superior, is in the N. E. of Minnesota. Passing through the chain of Great Lakes on leaving Lake Ontario, it flows N. E., first through the beautiful district known as the Thousand Isles, from the number of islands large and small (in all about 1,500), which here vary its course, and then forms the wide expanses called Lakes St. Francis (just after quitting the United States boundary), St. Louis (just above Montreal Island), and St. Peter (a little above Three Rivers, between Montreal and Quebec). Below Quebec it forms a broad estuary, and it enters the Gulf of St. Lawrence by a mouth 26 miles wide, between Point des Monts (Saguenay) and the Gaspé Peninsula. Length from Lake Ontario to the Gulf 760 miles, to the W. point of Anticosti 1,034 miles. The height of Lake Ontario above sea-level is 246.6 feet of which the river descends 206.75 feet in the 348 miles above Montreal. Below Montreal accordingly, the total fall is about 40 feet or about 1 foot in 10 miles, a rate presenting no difficulty for navigation; and since the construction of a ship canal, 27½ feet deep, through Lake St. Peter, the largest merchant vessels afloat have been able to reach that city in summer. In the stretches above Montreal the fall of the river bed takes place in a succession of rapids, to avoid which canals have been constructed. These are in the ascending order the Lachine Canal, 8½ miles long, with 5 locks, and a rise of 45 feet; Beauharnois Canal, 11¼ miles long, with 9 locks, and a rise of 82½ feet; Cornwall Canal, 11 miles long, with 6 locks, and a rise of 48 feet; Farran's Point Canal, ¾ miles long, with 1 lock, and a rise of 4 feet; Rapide Plat, 4 miles long, with 2 locks, and a rise of 11½ feet; and Galops Canal, 7⅝ miles long, with 3 locks, and a rise of 15¾ feet. The basin of the St. Lawrence is estimated to contain 297,000 square miles, of which 95,000 are covered with the waters of the Great Lakes.

St. Lawrence, Cape, the N. projection of Cape Breton Island which is a part of the province of Nova Scotia. It is about 100 miles long.

St. Lawrence, Gulf of. See GULF OF ST. LAWRENCE.

St. Lawrence Island, an island in Bering Sea which belongs to Alaska. It is inhabited by Eskimo. It is 100 miles long, 35 miles wide, and its altitude is 492 feet.

St. Lawrence University, a coeducational institution in Canton, N. Y.; founded in 1856 under the auspices of the Universalist Church; now non-sectarian in control; has endowment of over \$530,000; grounds and buildings valued at over \$225,000; scientific apparatus, etc., \$20,000; volumes in the library, about 25,000; ordinary income, \$120,000; average number of faculty, 40; students, 550.

St. Leger, an English horse race which is next in importance to the Derby. It was established in 1776, and in 1778 it was given the permanent name as a tribute to Colonel Anthony St. Leger. It is run at Doncaster in September, and three-year-olds may enter.

St. Louis, a city of Missouri; the chief city of the State, the commercial metropolis of the Mississippi valley, and fourth city of the United States in population and industry. It is situated on the W. bank of the Mississippi river, 20 miles below its junction with the Missouri river, 600 miles N. of New Orleans, and 875 miles S. W. of New York. With its suburbs extending in every direction, it is nearly enclosed by three rivers—the Missouri to the N., the Mississippi to the E., and the Meramec to the S. and W.; but it is by the Mississippi that its character has been determined. For a distance of 19 miles this river fronts the city, and its long graceful curve is well adapted for the development of an immense river traffic—the original basis of the city's importance. From the river front, St. Louis rises in a series of terraces, the third and highest being about 200 feet above the river level. The city extends about 6½ miles from the river westward, covering an area of 61.37 square miles. Still further W., as far as 30 miles from the river, are pretty suburban villages, linked to the heart of the city by trolley and steam roads. On the E. side of the river are the Illinois suburbs of East St. Louis, Granite City, Venice, and Madison, with about 100,000 inhabitants, connected with St. Louis by two huge steel bridges for railways and vehicles and by many railroad and passenger ferries. For 20 miles N. and S. of the city, up and down the great river, are scattered the homes of a large number of its inhabitants, gathered in small towns or situated in comfortable isolation, perched on the high bluffs, or hidden in the woods on the shore. The total population of the city and its suburbs is about 900,000. About 14 miles S., on the bank of the Mississippi, is Jefferson Barracks, an unfortified United States military post, covering an area of 1,379 acres. Connected with the Barracks is a national cemetery of 120 acres, containing 12,000 graves. The remains of Revolutionary soldiers buried at the old Bellefontaine military post, N. of the city, were

recently removed by the United States government to this cemetery, and a boulder monument was erected to their memory. Favorite pleasure resorts in the neighborhood are Creve Cœur lake, 20 miles to the N. W., Montesano, Crystal City, Piasa Bluffs, and Meramec Highlands. Near the latter is Brownhurst, containing a splendid private collection of orchids.

Approaches and Bridges.—St. Louis is connected with St. Paul in the N. and New Orleans in the S. by numerous lines of freight and passenger steamboats. Powerful tugs towing deeply laden barges in either direction lend animation to the river scene. The connections by land are unsurpassed. Twenty-seven railroads enter the city from every direction, discharging their passengers and cargo either in the suburbs, or in the great union station, on Market street between 18th and 20th streets, the only station in St. Louis where through business is handled. The station proper, with the train sheds, covers an area of over 13 acres, with the power house and mail buildings 33 acres, and with storage yards and connections 73 acres. Thirty-three tracks with a total length of over six miles are under roof. The front of the station extends for a distance of 606 feet, and its depth is 700 feet. The main waiting hall, with its fine wagon vault, is elaborately decorated. The subway area under the train shed, for handling baggage, mail, and express, is 157,700 square feet. The station was opened on Sept. 1, 1894, and its cost has amounted to \$12,000,000. Smaller stations for suburban traffic are at the foot of Washington avenue, at the end of the Eads bridge, at the corner of Fourth street and Chouteau avenue, and at other points. The steamboat landings are near Eads bridge. This bridge, also known as the St. Louis bridge, thrown across the broad Mississippi to East St. Louis, is deservedly the especial pride of the city. Seven years were occupied in its construction, it having been completed on May 23, 1874. It consists of three steel spans resting on massive limestone piers. The middle arch has a span of 520 feet, and the two side arches have each a span of 502 feet. The highest part of the arches is 55 feet above water. It has two stories, the lower one having a double-track steam railroad, and the deck a highway 75 feet wide. Trains enter the lower track by a tunnel, 4,890 feet long, beginning near the corner of 12th and Cerre streets. The bridge is 6,220 feet long, and its cost was \$6,536,790. Another great bridge, the Merchants', spans the Mississippi from Ferry street, S. of the water works, to Venice and Madison, on the Illinois side. It has three spans, each 517 feet long and 70 feet high, and is used exclusively for railroad passenger and freight traffic. Its length is 1,566 feet, and with the approaches 4,549 feet. It was built

during 1889-90 and has cost about \$3,000,000. The Illinois Traction Co., controlling an interurban electric railway system with 500 miles of line in Illinois, is (1907) starting a new bridge, $\frac{1}{4}$ mile S. of the Merchants' bridge, which it will resemble. Its cost will be about \$2,500,000, and \$2,500,000 additional will be expended on terminals in St. Louis. The Manufacturers' railway has an independent terminal system in South St. Louis, and it proposes boring a tunnel through bedrock under the Mississippi. For the new municipal railroad and wagon bridge see under *Administration and Public Interests*.

Streets.—The city contains over 900 miles of streets, 523 miles being well paved. The business district, which forms a rough rectangle of 1 mile along the river front and 3 miles back from it, is paved with granite, partly surfaced with asphalt. The streets generally run N. and S., or E. and W., excepting the very long ones, such as Broadway, which runs with the curve of the river the whole 19 miles of the city's length and is one of the longest streets in the world; Grand avenue, which runs nearly half-way between the river and the W. boundary of the city, joining Broadway at its N. and S. ends, thus forming with it a pointed ellipse; and Kingshighway, which is further W., traverses the city from N. to S., and passing by the two most beautiful parks—Forest park and Tower Grove park—is being converted into a charming boulevard. Broadway, 5 blocks from the river, and Olive street, which, crossing Broadway, runs from the river to the city's W. limits, contain many of the fashionable retail shops and department stores. Washington avenue, which parallels Olive street 3 blocks to the N., is the principal wholesale street. On this and adjacent streets are located the great wholesale and jobbing houses dealing in dry goods, notions and related lines, millinery, clothing, carpets, furniture, boots and shoes, trunks, and other branches. The business of these streets is rapidly extending westward, causing the erection of great warehouses and business blocks of the modern type. Throughout the city, which abounds in private homes, the absence of frame dwellings is noticeable. Outside of the modern steel frame "sky-scrapers" in the business district, the houses are all of brick and stone. The E. and W. streets, as well as their houses, are numbered from the river westward, the houses running 100 numbers to the block. With like regularity, the streets running N. and S. are numbered in each direction from Market street, which runs in the N. portion of the city from the river to its W. limits.

Among the unique features of the city are the practically enclosed private streets, called "places," in the residential sections. With their well-kept lawns, fine driveways,

and park-like residences, they are extremely pleasing to the eye. Within their limits an air of quiet and elegance prevails at all times, offering a delightful contrast to the noise and rush of business in the E. sections. Vandeventer place, between Grand and Vandeventer avenues, is the oldest of this class of residence reservations. With its imposing gateway entrances and beautiful residences, it is one of the most charming spots in the city. Kingsbury place and Washington terrace are situated in the fashionable W. part. Portland and Westmoreland places run westward from Kingshighway to Union boulevard. Other fashionable streets are Lindell, West Pine, Forest Park, Flora, Hawthorne, and Longfellow boulevards, and Berlin and Maryland avenues.

Parks.—St. Louis has 2,268 acres of public parks and pleasure grounds, of which only the most noteworthy can be mentioned here. The largest of these (1,372 acres) is Forest park, on the W. side of the city, about $4\frac{1}{2}$ miles from the river. It contains several lakes, and the muddy river Des Pères meanders through it. It has fine drives and trees, but a great many of the latter were cut down to make room for the buildings of the Louisiana Purchase Exposition of 1904, which occupied one-half of its area. Several of the above-mentioned "places" adjoin it or are in its vicinage. Tower Grove (276 acres) is the most beautiful park in the city. It runs from Grand avenue on the E. to Kingshighway on the W., forming a long narrow oblong. It contains almost every tree or shrub that will thrive in this climate, and bronze statues of Shakespeare, Columbus, and Humboldt, designed by Ferdinand von Müller, of Munich. The Shakespeare statue is supported by a pedestal with bronze panels, giving in relief the grave scene in "Hamlet," Lady Macbeth in the sleep-walking scene, Queen Catherine confronting her accusers in "Henry VIII.," and Ben De Bar's impersonation of Falstaff. This park was bequeathed to the city by Henry Shaw, who also founded and endowed the Missouri Botanical Garden, also known as Shaw's Garden (75 acres). His residence was for years in its center, and his mausoleum stands among its trees, most of which he planted. He died in 1889, leaving an estate of about \$1,300,000 as an endowment for the Garden. It is situated on Tower Grove avenue, opposite Tower Grove park, and ranks first among American botanical gardens. Its herbarium contains about 525,000 specimens, and about 16,000 species of living plants are represented. On Compton Hill, E. of the Botanical Garden, fronting South Grand avenue, is Reservoir park (40 acres), noted for its fine oak trees. It contains one of the tall water towers that form a part of the city's water system. E. of Reservoir

park, in the E. part of the city, is Lafayette park (30 acres), which contains a bronze replica of Houdon's Washington and a bronze statue of Senator Benton, the latter by Harriet Hosmer. S. of this is Benton park ($14\frac{1}{3}$ acres), one of the beautiful spots of the city. Other parks are Carondelet (183 acres) in the S., and O'Fallon (158 acres) in the N. Near the latter are Bellefontaine Cemetery (350 acres) and Calvary Cemetery (415 acres).

Buildings.—The business district is dominated by lofty steel frame structures, among the most imposing of which are the buildings known as the Wright, Frisco, Pierce, Chemical, Missouri Trust Co., Mississippi Valley Trust Co., Commonwealth Trust Co., Union Trust Co., National Bank of Commerce, Third National Bank, and other buildings of the kind among the numerous department stores and hotels. Among the latter, the Planters, the Washington, the Jefferson, the Buckingham, the Terminal, and the Marquette deserve particular mention. The great daily newspapers, such as the "Republic," "Globe-Democrat," "Star," "Post-Dispatch," "Times," and the German "Westliche Post," "Anzeiger," and "Amerika," have each its great office building. Among the numerous club houses may be mentioned those of the Union, Mercantile, Columbian, Missouri Athletic, St. Louis, University, Liederkrantz, Woman's, Log Cabin, Paddle and Saddle, and Glen Echo Country clubs. The principal theaters are the Grand Opera House (seating capacity 2,200), Olympic (2,400 seats), Columbia, Havlin's, Gaiety, Standard, Century, and Imperial. Among semi-public buildings, the Merchants' Exchange is notable. Its main hall, with painted ceiling, is 220 feet long. Here the "grand ball of the veiled prophet," the society event of the year, is given during the so-called "fall festivities," which are in the style of the New Orleans Mardi Gras.

The city hall, French Renaissance in style, resembling a French hôtel de ville of the sixteenth century, is situated upon beautiful grounds in the E. part of the city. A statue of General Grant adorns the Clark avenue front. The building is constructed of brick, granite, and sandstone, is 240 by 350 feet, and has a basement and 4 stories. The central portion is an open space, surrounded by glass-covered galleries. There are 150 committee rooms, city offices, ante-rooms, and two council chambers. Begun on July 19, 1896, its cost approximated \$2,000,000. The court house, occupying the block bounded by Fourth, Broadway, Market, and Chestnut streets, is one of the best examples of the classic style in the country, contains frescoes by Wimar, and is surmounted by a dome 175 feet high, the gallery of which commands a splendid view of

city and river. It was completed in 1862 at a cost of \$1,200,000. Another notable building is the post office, and some of the municipal high schools have pretty structures. Among the newer buildings is the new police headquarters, which cost \$250,000. A new Criminal Courts building to cost \$2,000,000 is planned, as well as an extension to the Insane Asylum, to cost \$1,000,000. A new Coliseum is to be erected on Jefferson and Washington avenues, with 15,000 seating capacity.

Churches and Charitable Institutions.—Among religious edifices, of which there are over 350, may be mentioned the First Congregational, Second Presbyterian, Fountain Park Congregational, Church of the Messiah, Lindell Avenue and St. John's, both Methodist Episcopal, Union Methodist, Christ Church Cathedral (Episcopal), Temple Shaare Emeth, Temple Israel, the Christian Science Church, St. Peter's, St. Xavier's, St. Alphonsus, the old Roman Catholic Cathedral, and the new St. Louis Cathedral (Roman Catholic), now in course of construction at Lindell boulevard and Maryland and Newstead avenues. The last will be one of the great architectural features of the city. It will have a depth of 400 feet upon its major axis, a width of 212 feet through the transepts of its minor axis, and a magnificent dome rising to an altitude of 200 feet from the sidewalk and terraces. The material of the exterior is gray granite, trimmed with dark-blue stone. The interior design is modeled on the Byzantine. Its seating capacity will be between 4,000 and 5,000, and the cost will exceed \$1,000,000. St. Louis is the seat of a Protestant Episcopal bishop and a Roman Catholic archbishop.

Of the numerous charitable institutions, many of which are housed in fine structures, only a few can be mentioned here. St. Luke's hospital, established in 1865, is open to all irrespective of creed or nationality, as are St. Anthony's, the Mullanphy, and all the others. Its new buildings on Delmar boulevard were completed in 1904. It is also a training school for nurses. Other institutions of wide usefulness are the new city hospital on Carroll street, the Jewish hospital, the Missouri Baptist sanitarium, the Methodist Orphans' Home, the Masonic Home, the City Insane Asylum, and the Altenheim (German home for the aged).

Educational Institutions.—Among the leading educational institutions of St. Louis stands Washington University, the main part of which occupies a commanding site, comprising 115 acres W. of Forest park. Among the buildings already completed are University Hall, the chemical and physical laboratories, the architectural and engineering buildings, the library, various dormito-

ries, and a gymnasium. The material of these buildings is red Missouri granite; they are designed in the Tudor-Gothic style, and enclose several quadrangles. The schools of law, medicine, and dentistry have buildings of their own in the heart of the city, and the secondary schools associated with the university—Smith Academy, the Manual Training School, and the Mary Institute—have buildings in the west end. The university obtained its charter in 1853, and is non-sectarian. The total of its property is valued at upward of \$8,000,000, of which about \$5,500,000 are productive assets. Its library of 40,000 volumes is especially rich in works bearing on the history of the West. In 1906 it had 1,904 students, exclusive of those in the secondary schools. St. Louis University (Roman Catholic) is noted as the most eminent training school for the Jesuit priesthood in the country and as the oldest university in the Louisiana Purchase territory and the entire Mississippi valley. It was founded in 1829, consists of a college and schools of philosophy and science, divinity, and medicine (with a school of law soon to be opened), and is open to all irrespective of creed. In 1906 it had 836 students, of whom 451 were in the graduate departments. Other schools of higher or special education are the Christian Brothers' College; the Kenrick Theological Seminary; the St. Louis Dental College and the St. Louis College of Pharmacy, with about 200 students each; Visitation and Sacred Heart academies, St. Vincent's Seminary, Bishop Robertson and Hosmer halls, all for young women; and the Forest Park University for Women. The Museum of Fine Arts, in Forest park, contains a large collection of antique and mediæval sculpture, statuary, painting, pottery, etc. Among its pictures are several by Wimar, a St. Louis artist who painted Western natural scenery. Connected with the museum is the School of Fine Arts of Washington University. The leading scientific societies are the Academy of Science, the Medical Society, and the Missouri Historical Society.

St. Louis is well equipped with libraries. The public library, with about 220,000 volumes, is supported by the municipality, and a donation of \$1,000,000 from Andrew Carnegie is being used partly for the erection of a new central building on a site furnished by the city, covering two blocks in the downtown district, and partly for the erection of branch libraries. The excellent Mercantile library, with about 130,000 volumes, is sustained by private subscription. It has a large collection of books relating to the history of colonial Louisiana and the States and Territories formed from it, as well as on alchemy. Among its objects of art are canvases of Indian life by Catlin and of life in the early West by Bingham;

Harriet Hosmer's marble statue of Beatrice Cenci; T. R. Gould's "West Wind"; and William Brodie's portrait busts of Burns and Scott. The Missouri Botanical Garden has a remarkable collection of works on botany (22,000 volumes and 29,000 pamphlets). The library of the Missouri Historical Society (30,000 volumes) contains a rich collection of prehistoric antiquities of the Mississippi valley, and that of the Academy of Science contains some 15,000 books and 12,000 pamphlets.

Besides the numerous private institutions for both secondary and elementary instruction, the city maintains a comprehensive public school system ranging from the kindergarten to the high school and teachers' college. A compulsory education law is in force, and text-books are free. The first kindergarten and the first manual training school in the United States were established in St. Louis. During the school year 1906-7 there were enrolled in the public elementary schools 87,200 pupils, who received instruction from 2,090 teachers in 120 school buildings, 13 of the latter being reserved for negro children. There are 4 public high schools; one of these, with an enrollment of 400, is reserved for negro pupils. Teachers' College is a public institution for the training of high school graduates to the teaching profession. These schools are administered by a board of education, which is distinct from and independent of the other municipal departments, is vested with the power to levy a tax for school purposes within the limits prescribed by law, and consists of 12 members elected at large for a term of six years. About 35,000 pupils receive instruction in parochial and private schools.

Industry.—St. Louis ranks fourth among the great cities of the United States in respect of its manufacturing interests. Its industrial importance to the State of Missouri is shown from the following. According to the United States Census of Manufactures of 1905 the manufacturing establishments of St. Louis were credited with 70.1 per cent. of the capital invested in all the manufactures of the State, 62.1 per cent. of the wage-earners employed, 64 per cent. of the wages paid, 54.6 per cent. of the cost of materials used, and 60.8 per cent. of the value of the total product. It is impossible to enumerate here the immense variety of industries established in St. Louis. Only a few of the most important will therefore be given, with their leading features. The tobacco industry (exclusive of cigars and cigarettes) consisted in 1905 of 9 establishments, with a capital of \$51,707,000, employing 3,519 wage-earners (exclusive of salaried persons) who received \$1,420,000 in wages, and turned out a product valued at \$27,703,000. Malt liquors were manufactured

in 28 establishments, with a capital of \$39,687,000, employing 4,947 wage-earners who received \$2,998,000 in wages, and turned out a product valued at \$20,930,000. The

ments counted in the earlier census, as well as neighborhood industries. Comparing the two censuses on the same basis, the figures are as follows:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Miscellaneous Expenses (Rent, Interest, etc.)	Cost of Materials Used	Value of Products
1900.....	2,646	\$150,526,000	64,832	\$39,145,000	\$27,404,000	\$101,838,000	\$193,733,000
1905.....	2,482	265,937,000	82,698	42,642,000	37,183,000	137,740,000	267,307,000
Per cent. increase....	6.2 decrease	76.7	27.6	46.3	35.7	35.3	38.0

manufacture of boots and shoes was carried on in 18 establishments, with a total capital of \$6,700,000, employing 9,234 wage-earners who received \$3,957,000 in wages, and turned out a product valued at \$19,101,000. Slaughtering and meat packing was carried on in 14 establishments, with a capital totaling \$3,907,000, employing 1,205 wage-earners who received \$734,000 in wages, and turned out a product valued at \$17,168,000. Other great industries are: the manufacture of bags (other than paper), with a product in 1905 of \$5,772,000; carriages and wagons, with a product of \$5,068,000; bread and other bakery products, \$6,098,000; men's clothing, \$5,497,000, and women's clothing, \$3,075,000; the roasting and grinding of coffee and spices, \$6,725,000; foundry and machine shop products, \$8,230,000; paints, \$5,693,000; the printing and publishing of books, periodicals, newspapers, etc., \$15,246,000; and stoves and furnaces, \$5,523,000. There are many other important industries, of which the following have each turned out products valued at between \$1,000,000 and \$5,000,000: wooden packing boxes, barrels, brass castings, bricks and tiles, railway cars, chemicals, patent medicines, drugs, confectionery, iron, sheet iron, steel, wire rope and cable, electrical machinery, flour and grist mill products, food preparations, furniture, lumber, leather, saddlery and harness, pottery, photographers' materials, soap, shirts, art goods and statuary, stamped ware, cigars and cigarettes. The following table shows the industrial growth of St. Louis since 1880.

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1880	2,924	\$50,833,000	41,825	\$17,744,000	\$75,380,000	\$114,333,000
1890	6,148	141,872,000	82,911	41,795,000	122,217,000	229,157,000
1900	6,732	162,179,000	82,672	38,191,000	117,861,000	233,630,000

The Census of Manufactures of 1905 was taken on a narrower basis than that of 1900. It was confined to factories proper, thus excluding a large number of small establish-

Commerce, Transportation, etc.—St. Louis is a port of entry, the total of its imports from foreign countries during 1906 having amounted to \$5,398,000. But its direct foreign commerce is an insignificant item in its total and mostly indirect foreign commerce, and its domestic commerce surpasses both. Some idea of the vastness of this commerce may be formed from its shipments by rail, which amounted in 1906 to nearly 40,000,000 tons. It is the great distributing center of the great and rapidly growing Southwest, as well as the Southeast. Its annual shoe sales are estimated at \$60,000,000; dry goods, \$65,000,000; hardware, \$45,000,000. It is one of the great markets of the country for grain, flour, and live stock, receiving and distributing annually between 60,000,000 and 80,000,000 bushels of grain (79,243,309 bushels in 1906), 4,000,000 barrels of flour, and about 4,000,000 head of cattle, sheep, and hogs (1,314,826 cattle, 2,411,092 hogs, and 650,884 sheep in 1906). The mule market is the greatest in the world. The fur trade is a great specialty. The shipments of cotton amount to over 700,000 bales a year. The deposits in its banks, some of which are among the greatest in the country, have grown from about \$120,000,000 in 1900 to about \$211,000,000 in 1907. There are 13 National banks and 33 State banks and trust companies. The exchanges of the clearing house amounted to \$2,972,653,000 in 1906, having grown from \$387,408,000 in 1870, \$711,459,000 in 1880, \$1,118,573,000 in 1890, and \$1,688,549,000 in 1900.

Local transportation is altogether by trolley lines, of which there are some 450 miles in the city and 100 miles in the suburbs. In 1906 they carried over 207,515,000 passengers.

Administration and Public Interests.—The city possesses the functions of a county. The heads of the boards of police, excise, and elections are, therefore, appointed by the governor, while the heads of most of the other departments are appointed by the mayor, those of the remainder being elective. The judges of the city or police courts are also appointed by the

St. Louis

mayor. The assessed valuation of property was over \$493,000,000 in 1906, nearly one-fifth of this sum having been added since 1901, and it costs about \$13,000,000 a year to carry on the municipal administration. Its great system of water works is self-supporting, and from time to time the price of water to consumers is being reduced. The water supply is derived from the Mississippi, and is filtered and purified by a perfected process. The capacity of the works is about 300,000,000 gallons a day, over 69,000,000 gallons being used. In June, 1906, a bond issue of \$11,200,000 was voted for the construction, at a cost of \$3,500,000, of a free municipal railroad and wagon bridge over the Mississippi and for parks, boulevards, public buildings, and other municipal improvements. The total indebtedness of the municipality amounted to \$21,019,000 in 1907.

History and Population.—On Feb. 14, 1764, a fur-trading post was established on the present site of St. Louis by the fur trader Colonel Pierre Laclède Ligueste, who sailed up the river from New Orleans and whose prophetic eye discerned the mighty future of the place, which was named after Louis IX. of France. Two years earlier the place was ceded, together with all the trans-Mississippi possessions of France, to Spain, which, however, did not take possession until 1770. It was retroceded to France by the treaty of San Ildefonso in 1800, and came to the United States in 1803 as a part of the "Louisiana Purchase." American immigrants began to arrive in large numbers, the first newspaper was published in 1808, and the place was incorporated in 1809. The arrival of the first steamboat on Aug. 2, 1817, was the beginning of a new era. John Jacob Astor established here in 1819 the western branch of the American Fur Co., whose shipments soon amounted to \$200,000 a year. In 1822 St. Louis received its city charter. In 1849 a fire destroyed about \$3,000,000 worth of property, and an epidemic of cholera carried off 4,000 inhabitants. But about this time commenced the great growth of the city, owing mainly to three factors: the heavy German immigration consequent upon the failure of the revolution of 1848, the beginnings of railroad building in Illinois, and the migration of gold seekers to California. During the Civil War the sympathies of the people were divided, but the city was knitted with bonds of iron and steel to the Union and formed the base of Federal operations for the control of the lower Mississippi and its tributaries. On May 27, 1896, St. Louis was visited by a terrific tornado, which caused 300 deaths and a loss of property valued at \$10,000,000. In 1903 the floods raised the river 38 feet, broke the levee, and did great damage to East St. Louis. In 1904 the Exposition to commemorate the

St. Lucia

centenary of the Louisiana Purchase was held here. (See LOUISIANA PURCHASE EXPOSITION.)

When St. Louis passed to Spain, its population was about 500, and when it passed to the United States, it was still under 1,000. Since 1810, the date of the first Federal census, the population of the city and county has been as follows: 1810, 5,667; 1820, 10,049; 1830, 14,125; 1840, 35,979; 1850, 104,978; 1860, 190,524; 1870, 351,189. The population of the city alone has been: 1810, 1,400; 1820, 4,000; 1830, 6,694; 1840, 16,469; 1850, 77,860; 1860, 160,773; 1870, 310,864; 1880, 350,518; 1890, 451,770; 1900, 575,238. In the last mentioned year the population consisted of 288,197 males and 287,041 females. According to race there were 539,385 whites and 35,516 negroes, besides a few Chinese and Indians. The foreign-born numbered 111,356, of whom 58,781 were Germans, 19,421 were Irish, 7,302 English, Welsh, and Scotch, 5,714 Austrians, 4,785 Russians, besides Canadians, Scandinavians, Italians, Poles, and others. In 1906 the population of St. Louis, exclusive of its suburbs, was estimated by the Federal Census Bureau at 649,320; in 1910 it was 687,029.

Revised by D. J. McAULIFFE.

St. Louis (săn lōō-ēē'), a town on the French island of Réunion, on the S.W. coast, near the mouth of the St. Etienne river. It is connected by rail with St. Denis and St. Pierre. Pop. (1902) 12,541.

St. Louis (săn lōō-ēē'), a town of French West Africa, capital of the colony of Senegal as reorganized in 1904. It is situated on St. Louis island, 11 miles from the mouth of the Senegal river, which is obstructed by a sand bar. It is one of the finest towns in West Africa, with public buildings, a governor's palace, and a cathedral. There are a commercial school and a normal school for the training of native teachers, interpreters, kadis (native judges), and the sons of chiefs. The city is the terminus of many caravan routes from the Sahara, and is connected by railroad (163 miles) to the Senegal towns of Rufisque and Dakar, the latter being the seat of the Governor-General of French West Africa and a fortified naval station. During the rainy season there is a river service on the Senegal to Kayes, 490 nautical miles inland. The native inhabitants of the town are French citizens and have the right to vote. Pop. of commune (1904), 24,070.

St. Lucia, the largest of the Windward Islands, in the West Indies, 42 miles long and from 15 to 20 wide; area, 233 square miles; pop. (1906) 53,389. The exports are sugar, cocoa, logwood, etc. Much of the island is high and rocky land, covered with well-nigh impenetrable forest, and it contains extensive deposits of sulphur. The climate is in the main healthy, a fresh trade

St. Lucy

wind blowing almost constantly. The island, discovered in 1502, was colonized by the French in 1563; but between that date and 1803, when it definitely became an English possession, it five or six times changed hands between France and England. The capital is Castries.

St. Lucy. See LUCY.

St. Luke. See LUKE.

St. Malo, a seaport in France, department of Ille-et-Vilaine, on an island at the mouth of the Rance river. It is a watering place and has important commercial interests; is strongly fortified; has extensive docks and quays, notable ramparts, a castle, and parish church (formerly a cathedral); and is noted for the height of the tides (40 to 50 feet). It was the birthplace of Cartier, Mahé de la Bourdonnais, Lametrie, Maupertuis, Lamennais, and Châteaubriand. The destruction of the town was attempted by the English in 1693, 1695, and 1758. Pop. (1901), commune, 11,486.

Saint-Marc-Girardin, François Auguste, a French literary critic; born in Paris, France, Feb. 12, 1801. With Philarette Chasles he wrote "View of French Literature in the 16th century" (1828), which won the first prize of the Academy. He wrote also: "Political and Literary Notes on Germany" (1835); "Intermediate Education in Germany" (2 vols. 1835-1838); "Essay on Literature and Morals" (2 vols. 1845); "Course of Dramatic Literature; or, The Use of the Passions in the Drama" (1843; 11th ed. 5 vols. 1875-1877); "Recollections and Political Reflections of a Journalist" (1859); "Lafontaine and the Fabulists" (2 vols. 1867); "J. J. Rousseau, his Life and Works" (2 vols. 1875). He died April 11, 1873.

St. Mark. See MARK.

St. Martin, one of the Lesser Antilles, W. I. Since 1648 it has been divided between France and the Netherlands. It exports sugar, cotton, tobacco, maize, etc., and large quantities of salt. The French portion, a dependency of Guadeloupe, has an area of 20 square miles and a population of 3,500. The Dutch portion, a dependency of Curaçao, has an area of 18 square miles and a pop. (1901) of 3,216.

St. Martin. See MARTIN, ST.

Saint-Martin, Louis Claude, a French philosopher; born in Amboise, France, Jan. 18, 1743. Influenced by Böhme and Myst-rasin, he was a vigorous opponent of sensationalism and materialism. Of his numerous works among the best known are: "Of Errors and Truth" (1775); "Of the Spirit of Things" (1800); and "The Man of Desire" (1790). He died in Aurai near Chatillon, Oct. 14, 1803.

St. Michael's Mount

St. Mary's River, the channel connecting Lake Superior with Lake Huron, having more the character of a lake than a river. At Sault Ste. Marie, or St. Mary's Falls, there is a fall of 16 feet, and to enable vessels to avoid this a ship canal was built in 1855, and since greatly enlarged and improved. See SAULT STE. MARIE.

St. Matthew. See MATTHEW.

St. Maurice, a river of Canada, province of Quebec, which enters the St. Lawrence at Three Rivers after a course of about 300 miles through fine scenery and extensive forests. About 22 miles above its mouth are fine falls 160 feet high. It expands at many places into lakes.

St. Michael, an important trading-post in Alaska, on the Bering Sea, and the port at the mouth of the Yukon river. Here ocean steamers transfer and receive freight which is carried up and down the Yukon by smaller steamers. To this port furs from the interior, some places as far distant as 2,000 miles, are brought for shipment to San Francisco. St. Michael is on the dividing line between the Innuvit habitations of the Arctic and the Pacific. It was established by the Russians in 1835. When the rich placer mines on the Forty-Mile and Birch creeks were discovered St. Michael became of large importance as the place of transfer for travel between the States and Central Alaska. In 1897 its growth received a new stimulus by the opening up of the Klondike region. During the summer there is a floating population of from 3,000 to 4,000, dwindling to a few hundred in winter. In order to accommodate the summer influx large hotels and warehouses have been built.

St. Michael's Mount, a conical and isolated granite rock in Mount's Bay, Cornwall, England, 3 miles E. of Penzance. It communicates with the shore by a causeway 560 yards long, which, however, is covered with water 8 hours out of 12, and sometimes is impassable for two or three days together. The Mount is 195 feet high, is 5 furlongs in circumference, and is crowned by an old and picturesque castle—now used as a manorial residence—surmounted by a tower, on one angle of which there is a projecting stone lantern, popularly called "St. Michael's Chair." At the base of the N. or landward side of the Mount is a fishing village. The "guarded mount" is said to have received its name from an apparition of St. Michael to some hermits; and Edward the Confessor founded on it a Benedictine priory, which in 1088 was annexed to the Abbey of Mont St. Michel in Normandy. After the Dissolution it became the residence of five families in turn, till it was sold in 1660 to its present proprietors.

Saint-Michel

Saint-Michel, Mont, a fortified rocky height in the department of La Manche, France, in Cancale Bay, 7 miles S. W. of Avranches. On its summit are a castle, and an interesting church of the 10th century. There is a straggling village on the hill, with a population of about 300. It forms altogether an extremely picturesque mass, and can be approached across the sands at low water.

St. Monica. See MONICA, St.

St. Nazaire, a seaport of France, department of Loire-Inférieure, on the N. side of

St. Nicholas

chiefly brandy, wine, coal, wheat and flour — these four in transit — eggs and poultry, sardines, butter, bone dust, vegetables, dyes, glass, and toys. Pop. (1906) 35,762.

St. Nicholas, an early bishop of Myra in Lycia, Asia Minor. He is a popular saint in the Roman and the Greek Churches, being considered the patron of sailors, travelers, merchants, parish clerks, virgins and children. His feast day, falling on Dec. 6, was once elaborately celebrated in English public schools, the solemnities continuing to Dec. 29. These curious practices died out



ST. OMER: ABBEY OF ST. BERTIN.

the estuary of the Loire, 40 miles W. by N. of Nantes. Between 1831 and 1887 \$7,250,000 was spent on harbor improvements, extensive docks (82 acres) having been built in 1845-1857 and 1864-1881 to accommodate the larger vessels that were unable to get up the Loire to Nantes. Since these began to be used the shipping of the place has increased at a very rapid rate. The most important of the imports are wine, coal, tar, iron and lead, wheat and flour, timber, and manure; the exports embrace

after the Protestant Reformation, vestiges of it lingering longest at Eton. The best-known legend connected with St. Nicholas' name represents him as visiting, on three successive nights, the home of a poor nobleman distressed about the future of his three daughters, and throwing a purse of gold through the window each night. It has long been a custom in certain European countries to keep St. Nicholas' Eve by placing gifts in the shoes or stockings of children. This custom has been transferred to Christ-

St. Nicolas

mas Eve and the transformed saint is known as Santa Claus (from the Dutch Sant Nicolaus). He is represented in art clad in the robes of a bishop carrying three children, three purses or three golden balls. Clement Clark Moore's verses called "The Visit of St. Nicholas," beginning "'Twas the night before Christmas," have done much during the last half-century to form the popular ideal of Santa Claus in the United States.

St. Nicolas, a town of Belgium, in East Flanders, 12 miles W. by S. of Antwerp, in the district of Waes, a densely peopled and productive agricultural region. It has a large flax market, and manufactures cotton and woolen stuffs, lace, needles, bricks, and pottery. A flourishing trade is carried on in linens, flax, corn, etc. Pop. (1899) 30,152; (1906) 33,074.

St. Olaf College, a coeducational institution in Northfield, Minn.; founded in 1874 under the auspices of the Lutheran Church; has grounds and buildings valued at over \$160,000; endowment, \$20,000; volumes in the library, about 7,500; scientific apparatus, etc., \$15,000; ordinary income, \$60,000; average number of faculty, 30; average student attendance, 500; graduates, over 250.

St. Omer, a town of France, and second-class fortress, department of Pas-de-Calais, in a marshy site, on the Aa, 26 miles S. E. of Calais. The chief objects of interest are the Gothic cathedral (13th-15th century), with remarkable sculptures, the ruined tower and arches of the Benedictine Abbey Church of St. Bertin, an arsenal, a museum, and a library. A college for the education of English and Irish Catholics was opened at St. Omer in 1592. It was closed, however, during the Revolution, but still exists as a seminary. Alban Butler was a president, and O'Connell a student. The people carry on active manufactures of tobacco-pipes, tulle, cambric, cloth, and muslin, and a brisk trade in provisions (eggs, vegetables, etc.), sugar, and spirits. Pop. (1901) 20,687.

Saintonge, a former French maritime province, now forming mainly the department of Charente-Inférieure. The capital was Saintes (*q. v.*).

St. Patrick. See PATRICK, ST.

St. Paul, a city of Minnesota, the capital of the State, and county-seat of Ramsey co. It is situated on both sides of the Mississippi river, at the head of navigation for large steamboats, about 10 miles E. by S. of Minneapolis, the two municipalities being known as the "Twin Cities," and their suburbs merging into one another. It is about 2,150 miles from the mouth of the Mississippi, 350 miles N. W. of Chicago, 290 miles N. W. of Milwaukee, 310 miles N. E. of

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Omaha, and 480 miles N. by W. of St. Louis. Included within the municipal limits are a number of islands in the river, and the suburbs of Hamline, Merriam Park (the most beautiful as well as the largest of the suburbs), Macalester, Ridgewood Park, St. Anthony Park, Desnoyer Park, etc., on the side toward Minneapolis. Outside of the city limits are North St. Paul, South St. Paul, a great meat-packing center, and West St. Paul, the last two being to the S. of the river. The total area of the city is 55.4 square miles, and the population was estimated in 1907 at 211,000.

General Features.—By far the greater portion of the city lies on the E.—or, rather, owing to the bend of the river, the N.—bank of the Mississippi, extending over a series of terraces, which rise from 695 feet above sea-level at the docks, to 1,010 feet above sea-level in the hills. The railroads enter along the foot of the bluffs, or through a narrow valley which gives access to the highlands and forms the only break in the bluffs on the N. bank of the river. The foot of the bluffs is occupied by the union depot, the railroad shops, factories, and wholesale houses. Rising above them are the great office buildings, the principal public buildings, the hotels and theaters, and the retail district. The latter is comprised mainly in E. 6th and E. 7th streets, which run parallel to the river, and Minnesota, Cedar, and Wabasha streets, which run at right angles to the above, about half a mile W. from the union depot. Situated on the highest slopes are the residential streets. St. Anthony Hill, to the W. of the business section, is the home of most of the wealthy citizens of St. Paul. Around the crest of this hill runs Summit avenue, lined with palatial residences, and affording fine views of the river gorge and the lower terraces of the city. Farther back are less pretentious homes. The streets, of which over 400 miles are in an improved condition, generally run N. and S. or E. and W., except in the immediate vicinity of the river, and are paved with asphalt throughout the business district as well as in a large part of the residential district. In the latter the streets are lined with shade trees and lawns, and the houses are separated from one another by grassy spaces. The longest street is Seventh avenue, running from the extreme S. W. to a point not far from the N. E. corner of the city.

The general plan of the "west side," as the part of the city S. of the river bend is called, is closely analogous to that of the east side. First come the railway yards and factories, then some retail business blocks, finally the residential section on the higher terraces. The two parts of the city are connected by two railroad and three public bridges, which cross at a great height and give fine views of the river and its val-

ley. There are also some sixty smaller bridges over valleys and railway crossings in different portions of the city.

Parks.—St. Paul has a park system of remarkable extent and beauty. There were in 1906 78 parks, covering an area (including parkways) of 1,350 acres. Several of the smaller ones are in the heart of the business district or in its immediate vicinity. Phalen park, adjacent to Lake Phalen, is in the N. E., and Indian Mounds park (135 acres) in the S. E. The latter is on Dayton's Bluff, one of the highest points in the E. portion of the city, on the river bank, overlooking a wide stretch of river and valley. The mounds were burial places of the Sioux, who came here every spring to hold their annual grand councils. Roadways and walks through gulch and ravine lead from this park to the State fish hatchery. Harriet Island, in the Mississippi river, is a veritable park, with playgrounds, athletic field, and superb free public baths. The largest as well as the most beautiful of the parks is Como park, in the N. W. part of the city. It covers an area of 415 acres, 142 acres being occupied by Lake Como, and contains a famous lily pond, as well as a Japanese garden with rare plants and shrubs from Japan and dwarfed trees over 300 years old. To the W. of this park, outside of the city limits, are the grounds of the State Fair (200 acres), held by the State in the name of the State Agricultural Society. Here are handsome permanent buildings, in which is held every year, in the early part of September, a great exposition of farm products, farm machinery, and general merchandise, attracting 300,000 visitors from all sections of the Northwest and Western Canada. The enormous Amphitheater, recently erected, is capable of holding 20,000 people. The Fort Snelling military reservation, covering 2,331 acres to the S. W. of the city, and connected with the latter by a bridge over the Mississippi gorge (High bridge), forms practically a part of the park system. Some 25 miles of park driveways and river boulevard connect the parks of St. Paul with those of Minneapolis.

Buildings.—Foremost among the public buildings is the new State Capitol, on the square formed by the junction of Cedar and Wabasha streets, built of Minnesota granite and Georgia white marble, and surmounted by a magnificent dome. It is one of the handsomest public buildings in the country and has cost \$4,500,000. The city hall and court house, containing the city and county offices, is an imposing Gothic structure of gray stone, situated on the beautifully parked public square bounded by Cedar, Wabasha, 4th, and 5th streets. The new Federal Building, opposite Rice park, accommodates the post office, the Federal dis-

trict court, and other government offices. The armory, built of brown stone and brick and completed in 1905, has a large drill hall that can accommodate six companies. Other interesting public buildings are the old Federal Building, built of limestone in the Gothic style, and the old State Capitol, built of brick, with four wings surrounding a central tower. Among the great modern business and office buildings may be mentioned those of the "Pioneer Press," "Globe," and "Dispatch" newspapers, the New York and the Germania life insurance companies, the Manhattan, the Gilfillan block, the Endicott Arcade, the Capital Bank, and the First National Bank. Several department stores and industrial plants occupy imposing structures. The Minnesota Club house, situated in the business district, the City Library, several of the high schools, the Ryan and other hotels, are also notable architecturally. The leading theaters are the Metropolitan, the Grand, the Star, and the Orpheum. An Auditorium, costing \$450,000 collected by public subscription, and capable of seating 8,000 people, was completed in 1905.

Churches and Charities.—There are about 180 churches of all denominations, among which may be mentioned the People's Church, capable of seating 2,500 people, Christ Church (Episcopal), the Central Park Methodist Episcopal, the Park Congregational, the Central Presbyterian, the First Baptist, the Church of the Assumption, the old and the new Roman Catholic cathedrals, Church of St. John (Episcopal), Dayton Avenue (Presbyterian), House of Hope (Presbyterian), First Methodist, and First Swedish. There are several denominational orphan asylums, a children's home, St. Luke's, St. Joseph's, and other private hospitals, with accommodations for a limited number of free patients, and the city and county hospital. There is a trust fund of \$2,000,000 for the benefit of the city's poor, which was established by private benevolence.

Education.—St. Paul shares with Minneapolis the advantages of the State University, located in the latter city. The State Agricultural College, which forms a part of the university, adjoins the grounds of the State Fair. Connected with the college are the State Experiment Station and a model farm. There are 12 colleges, mostly under denominational control, including Hamline University (Methodist), Macalester College (Presbyterian), St. Thomas Seminary (Roman Catholic), the Hill Seminary (Roman Catholic), founded by Mr. James J. Hill, two Lutheran seminaries, St. Paul's College (German Methodist), and Concordia College (German Lutheran), with about 4,000 students. The public school system consists of 4 high schools, with about 2,400 pupils, and 52 elementary

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schools, with about 28,000 pupils. The members of the board of education are appointed by the mayor, and the annual expenditure on public schools is about \$775,000. The number of pupils in private and parochial schools is about 12,000. The leading libraries are the City Library, with 60,000 volumes; the State Law Library, with 30,000 volumes; and the State Historical Library, containing 70,000 volumes and a complete file of Minnesota newspapers. The last two are located in the State Capitol. There are published 5 daily newspapers, including one in German, and about 50 weekly and monthly publications.

Industries.—St. Paul ranks second among the industrial centers of the State, though it is far below Minneapolis in this regard. According to the United States Census of Manufactures for 1905, the manufacture of boots and shoes employed \$1,392,000 of capital, 1,041 wage-earners who received in that year \$456,000 in wages, used materials valued at \$1,277,000, and turned out a product valued at \$2,187,000. The railroad car construction and repair shops employed \$3,270,000 of capital, 1,825 wage-earners who received \$1,004,000, used materials valued at \$1,231,000, and turned out a product valued at \$2,345,000. The fur goods industry employed a capital of \$2,219,000, 1,003 wage-earners who received \$401,000 in wages, used materials to the value of \$1,711,000, and turned out a product valued at \$2,791,000. The production of malt liquors employed \$5,529,000 of capital, 354 wage-earners who received \$242,000 in wages, used materials valued at \$664,000, and turned out a product valued at \$2,596,000. Printing and publishing of all kinds, including newspapers and periodicals, employed \$2,607,000 of capital, 1,439 wage-earners who received \$951,000 in wages, used materials valued at \$1,003,000, and turned out a total product valued at \$3,737,000. Other important industries were: Bread and other bakery products, with an output amounting to \$1,019,000; men's clothing, with an output of \$1,366,000; the roasting and grinding of coffee and spices, \$1,106,000; foundry and machine shop products, \$1,748,000; lumber and planing mill products, \$1,486,000; saddlery and harness, \$1,008,000; tobacco, cigars, and cigarettes, \$1,158,000; slaughtering and meat packing (exclusive of South St. Paul, where the bulk of this industry is carried on), \$1,101,000; structural ironwork, \$828,000; copper-smithing and sheet iron working, \$573,000; furniture, \$573,000; and butter, \$562,000. The census quoted shows that, although St. Paul ranks below Minneapolis in extent of industries, its percentage of increase in value of products for 1905 was almost equal to that of the latter city. The industrial growth of St. Paul since 1880 may be seen from the following table:

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Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1880	593	\$3,739,000	5,230	\$2,254,000	\$5,719,000	\$10,286,000
1890	1,442	22,501,000	16,279	8,395,000	15,868,000	33,035,000
1900	1,591	28,208,000	17,593	7,670,000	19,465,000	38,541,000

The special United States Census of Manufactures for 1905 was confined to industries carried on under the factory system, to the exclusion of hand trades and neighborhood industries. Comparing the figures for 1905 with the corresponding figures for 1900, the results are shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1900	537	\$25,659,000	13,019	\$5,324,000	\$15,913,000	\$30,056,000
1905	614	36,401,000	14,363	7,211,000	19,488,000	38,319,000
Per cent. Increase	14.3	41.9	10.3	35.5	22.5	27.6

Commerce and Transportation.—St. Paul is a port of entry, its foreign commerce having amounted to \$3,693,000 for imports and \$5,783,000 for exports during the year ending June 30, 1906. It is also a tea-inspection port. Owing to its exceptional railroad connections, it is one of the greatest distributing centers of the Northwest, its wholesale and jobbing trade being estimated at \$300,000,000 per annum. The freight traffic for 1906 amounted to 170,125 carloads for receipts and 141,877 carloads for shipments. The stock yard business at South St. Paul—which, though a separate municipality, is commercially and industrially a part of St. Paul—amounted in the same year to \$32,947,000, there having been received 426,987 cattle, 59,677 calves, 860,810 hogs, 580,067 sheep, and 8,892 horses. There are 7 National banks, with resources and liabilities aggregating nearly \$40,960,000 in September, 1906. The average deposits of all the banks increased from \$21,813,000 in 1900 to \$33,554,000 in 1905, and the bank clearings increased from \$247,061,000 in 1900 to \$419,466,000 in 1906. Among the railroad systems centering in St. Paul are the Great Northern, the Northern Pacific, the Chicago, Milwaukee, and St. Paul, the Minneapolis and St. Louis, the Minneapolis, St. Paul, and Sault Ste. Marie, the Chicago Great Western, the Chicago, Rock Island, and Pacific, the Wisconsin Central, and other railroads. The steam-

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boat traffic has fallen off greatly since the introduction of railroads, but St. Paul is still connected by packet lines with the principal cities in the Mississippi basin. Interurban electric lines reach out in every direction, and the electric street lines, of which there were 142 miles in 1907, are operated in conjunction with those of Minneapolis under one company.

Administration and Public Interests.—The city is administered in accordance with the home rule charter of 1900. The mayor is elected for a term of two years. The council consists of an assembly of 9 members, elected at large, and a board of aldermen of 11 members, elected by wards. Other elective officers are the treasurer, comptroller, clerk, and justices of the peace. The mayor appoints the various administrative boards and heads of departments. A permanent charter commission may propose amendments to the charter, which obtain validity after ratification by popular vote. The present charter was adopted under the provision inserted in the State constitution in 1898, empowering cities to frame their own charters through commissions of freeholders appointed by the district courts.

The city owns its water works, which were purchased in 1880 at a cost of \$4,049,854; their value is now estimated at over \$7,000,000. The average daily consumption of water is about 9,000,000 gallons, the supply being derived from spring-fed lakes on the high land N. of the city. The streets are lighted partly by electricity, but mainly by gas. The budget for 1907, as adopted by the council, estimated the expenditure at \$2,922,000. The indebtedness of the city amounted at the beginning of 1907 to \$10,022,000, of which \$8,244,000 was in bonds. The value of the city's property was estimated at the same time at \$19,247,000.

History and Population.—The name of St. Paul is derived from a log chapel erected in 1841 by Father Galtier near the foot of Minnesota street. The few settlers were then mostly French hunters and traders, or their descendants. In 1849 the Territory of Minnesota was organized, with St. Paul as the capital. Up to that time the settlement was of no importance, but the flood of settlers pouring into the Northwest soon made it a trading center, owing to its situation at the head of steamboat navigation. The steamboats coming up the Mississippi brought supplies for the settlers, and returned with furs, lumber, and other products. In 1854 St. Paul received a city charter. The population has increased from 1,112 in 1850 to 4,716 in 1855; 10,401 in 1860; 20,030 in 1870; 41,473 in 1880; 133,156 in 1890; 163,065 in 1900; and 214,744 (census) in 1910. The population consisted in 1900 of 84,405 males and 78,660 females. There were 2,263 negroes. The foreign born numbered 46,819, or 28.7 per cent. of the

St. Paul's Rocks

total population, the most numerous elements being 13,958 Scandinavians, 12,935 Germans, 4,892 Irish, 4,572 Canadians, and 3,490 Austro-Hungarians. At the Paris Exposition of 1900 a medal was awarded to St. Paul as the healthiest city in the world. In 1906 the death rate was 9.60 per 1,000 of population.

St. Paul's, a cathedral in London, England, situated on Ludgate Hill, an elevation on the N. bank of the Thames. The site of the present building was originally occupied by a church erected by Ethelbert, King of Kent, in 610. This was destroyed by fire in 1087, and another edifice, Old St. Paul's, was shortly afterward commenced. The structure was in the Gothic style, in the form of a Latin cross, 690 feet long, 130 feet broad, with a lead-covered wooden spire rising to the height of 520 feet. The middle aisle was termed Paul's walk, from its being frequented by idlers as well as money lenders and general dealers. Old St. Paul's was much damaged by a fire in 1137, by lightning in 1444, again by fire in 1561, and was utterly destroyed by the great fire in 1666. The ruins remained for about eight years, when the rebuilding was taken in hand by the government of Charles II. (1675-1710). The whole building was completed at a total cost of \$7,556,010 by Sir Christopher Wren. It is of Portland stone, in the form of a cross. Its length is 510 feet; the width from N. to S. portico 282 feet; the general height is 100 feet. The whole is surmounted by a great dome raised on eight arches. Above the dome is a lantern or gallery terminated above by a ball and gilded cross, 404 feet from the pavement beneath. The elevated portico forming the grand entrance consists of 12 Corinthian columns, with an upper series of eight pillars of the Composite order, supporting a pediment; the front being flanked by two bell-towers 120 feet in height. The entablature represents in relief the conversion of St. Paul, a work of Francis Bird. On the S. front, which corresponds with the N., is a phoenix rising from the flames, with the motto, "Resurgam" (I shall rise again). The pavement of the interior is composed of slabs of black and white marble. The crypt contains the burial places of many famous men. Among the monuments to the illustrious dead are those of Howard, Johnson, Nelson, Howe, Reynolds, Heber, Rodney, Collingwood, Abercrombie, etc. The monument to Wellington, by Alfred Stevens, is accounted the finest work of its kind in England.

St. Paul's Bay, a bay on the N. coast of Malta, notable as being the traditional scene of St. Paul's shipwreck.

St. Paul's Rocks, a group of small islands in the Atlantic Ocean, E. of South

St. Paul's School

America. They are characterized by great boulders scattered over their surface, and by the rocks at their bases in the sea, making an approach to them dangerous.

St. Paul's School, an English school, in West Kensington, London; originally founded in 1509-1512. Among its pupils have been Major André, Camden, Roger Cotes, Sir P. Francis, Halley, Leland, the Duke of Marlborough, Milton, Robert Nelson, Pepys, Strype, and Judge Jeffreys.

St. Peter, a city and county-seat of Nicollet co., Minn.; on the Minnesota river, and on the Chicago, St. Paul, Minneapolis, and Omaha, and the Chicago and Northwestern railroads; 75 miles S. W. of St. Paul. It contains the State Hospital for the Insane, Gustavus Adolphus College (Luth.), high school, National and State banks, and several weekly newspapers. It has flour mills, quarries of limestone, manufacturing of machinery, and foundry products, and an assessed property valuation of nearly \$1,000,000. Pop. (1890) 3,671; (1900) 4,302.

St. Peter, Sisters of. See SISTERHOODS.

St. Peter, Lake, a sheet of water which is really an expansion of the St. Lawrence river, near Three Rivers. Many rivers flow into it, the largest being the St. Francis. There are many islands in its S. half, several of which are notable for beautiful scenery. The lake is 35 miles long and its greatest breadth is 10 miles.

St. Peter Port, the capital of the island of Guernsey, one of the Channel Islands; about 25 miles from St. Helier. It is a watering place and has a beautiful Gothic church. Pop. (1891) 16,658.

St. Peter's, the Cathedral of Rome, the largest and one of the most magnificent churches in Christendom. It is a cruciform building in the Italian style, surmounted by a lofty dome, built on the legendary site of St. Peter's martyrdom. In 306 Constantine the Great erected on this spot a basilica of great magnificence. In the time of Nicholas V. it threatened to fall into ruins, and he determined on its reconstruction, but the work of restoration proceeded slowly, and Julius II. (1503-1513) decided on the erection of an entirely new building. He laid the foundation stone of the new cathedral on the 18th of April, 1506, and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work till Michael Angelo was appointed in 1546. He nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII. Nov. 18, 1626. The extensive colonnade which surrounds the piazza and forms a magnificent approach to the church

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was begun by Bernini in 1667, and the sacristy erected by Carlo Marchionni in 1780. The interior diameter of the dome is 139 feet, the exterior diameter 195½ feet; its height from the pavement to the base of the lantern 405 feet, to the top of the cross outside 448 feet. The length of the cathedral within the walls is 613½ feet; the height of the nave near the door 152½ feet; the width 87½ feet. The width of the side aisles is 33¾ feet; the entire width of the nave and side aisles, including the piers that separate them, 197¾ feet. The circumference of the piers which support the dome is 253 feet. The floor of the cathedral covers nearly 5 acres, and its cost is estimated to have exceeded \$50,000,000.

St. Petersburg, the capital of the Russian empire, at the head of the Gulf of Finland and the mouth of the Neva. Before entering the sea the Neva subdivides into many branches, thus giving origin to no less than 100 islands of various sizes, the surfaces of which rapidly increase. Nearly 600 acres of land have thus been added to the area of St. Petersburg during the last 150 years. When a strong wind is blowing from the sea its level rises by several feet, and the poorer parts of St. Petersburg are inundated every year; but when the overflow exceeds 10 feet nearly the whole of the city is inundated too. In August, 1891, it rose for a few hours 10 feet above the average. Peter I. laid the foundations of his capital in 1702 on one of the islands of the delta, and dreamed to make of it a new Amsterdam. One single line of railway connects St. Petersburg with the head of the Volga and Moscow; another with Poland and Western Europe; a third with the Baltic provinces; and a fourth with Finland. The real connection between Russia and its capital was established through the Neva, which since it was connected by canals with the upper Volga became the real mouth of the immense basin of the chief river of Russia and its numberless tributaries. Owing to this connection St. Petersburg became, and has remained for more than 150 years, the chief port of Russia for the export of raw produce and the import of manufactured goods. Foreign trade and the centralization of all administration in the residence of the emperor have made of St. Petersburg a populous city covering 42 square miles.

The Great Neva, the chief branch of the river, which has within the city itself a width of from 400 to 700 yards, is so deep that large ships can lie alongside its granite embankments. But it is rather shallow at the mouth, with a narrow and sinuous channel across the bar, so that Cronstadt, built on an island 16 miles to the W. of St. Petersburg, remains both the fortress and the port of the capital. Since 1885 a ship canal, 22 feet deep, admits ships to the

Galernaya Harbor in the S. W. corner of St. Petersburg, and two-thirds of the foreign vessels unload within the city itself. The main body of the city, containing more than one-half of its inhabitants as well as all the chief streets, stands on the mainland, on the left bank of the Neva; and a beautiful granite quay, with a long series of palaces and mansions, stretches for $2\frac{1}{2}$ miles from the timber yards in the E. to the New Admiralty in the W. Only two permanent bridges cross the Neva; the other two, built on boats, are removed in autumn and spring, as well as when the ice of Lake Ladoga comes down the Neva in the beginning of May. The island Vasiliievsky, between the Great and Little Nevas, has at its head the Stock Exchange, surrounded by spacious storehouses, and a row of scientific institutions, all facing the Neva — the Academy of Sciences, the University, the Philological Institute, the Academy of Arts, and various schools and colleges. On the Peterburgskiy Island, between the Little Neva and the Great Neva, stands the old fortress of St. Peter and St. Paul, facing the Winter Palace, and containing the Mint and the cathedral wherein the members of the imperial family are buried; its old-fashioned casemates are used as political prisons. It has behind it the arsenal, and a series of wide streets bordered by small, mostly wooden houses, chiefly occupied by the poorer civil-service functionaries. Farther up the mainland on the right bank of the Neva is covered by the poorer parts of the city, but contains some public buildings and a great number of factories. Numerous islands, separated from each other by small branches into which both Nevas subdivide, and connected together by a great number of wooden bridges, are covered with beautiful parks and summer houses, to which most of the wealthier and middle-class population repair in the summer. The main part of St. Petersburg has for its center the Old Admiralty; its lofty gilded spire and the gilded dome of St. Isaac's Cathedral are among the first sights caught on approaching St. Petersburg by sea. Three streets radiate from it; the first of them is the famous Nevskiy Prospect.

A spacious square, planted with trees, encloses the Old Admiralty on three sides. To the E. of it rise the huge and magnificent mass of the Winter Palace, the Hermitage Gallery of Art, and the semicircular buildings of the general staff, which surround a square facing the palace, and adorned by the Alexandra column, a shaft of red granite 84 feet high. To the W. of the Admiralty is the Petrovskiy Square, where stands the well known statue of Peter I. — the work of Falconet. The cathedral of St. Isaac of Dalmatia in the S. of it is an almost cubic building (330 feet long, 290 broad, and 310 high), surmounted by one large and lofty

and four small gilded domes. This church, erected by Nicholas I., is devoid of architectural beauty, but its peristyles of immense red granite monoliths give it a character of rude majesty. Its interior decorations are very rich, and it contains pictures painted by the best representatives of Russian art during the last 75 years. A somewhat stiff monument to Nicholas I. by Baron Clodt stands on a large square to the S. of the cathedral.

The Nevskiy Prospect is one of the finest streets of the world, not so much for its houses — they are of a very mixed and mostly vulgar architecture — as for its immense width and length, the crowds which overflow its broad sidewalks, and the vehicles which glide over its wooden pavement. It runs for 3,200 yards, with a width of 130 feet, from the Admiralty to the Moscow railway station, and thence with a slow bend toward the S. for another 1,650 yards, to reach again the Neva near the Smolyni convent. About midway in its first part it passes by the Kazan cathedral, the Gostinoi Dvor — a two-storied building containing numerous shops — the public library, the square of Catharine II. adorned with a gorgeous but tasteless statue of the empress, and the Anitchkoff palace. It crosses the Fontanka on a broad bridge adorned by four groups in bronze of wild horses with their tamers.

The climate is less severe than might be expected, but it is unhealthy and very changeable on the whole. The average temperatures are 15.4° F. in January, 64° in July, and 38.6° for the year. Still, the Neva remains frozen for an average of 147 days every year. A short but hot summer is followed by a damp autumn and very changeable winter, severe frosts being followed by rainy days in the midst of winter, and returning in April and May after the first warm days of the spring.

As a manufacturing center St. Petersburg has not the importance of Moscow, the total yearly production of its factories (cottons, various textiles, metals, leather, sugar, guns, porcelain goods, etc.) not exceeding \$100,000,000. There are many large factories in the surrounding country, but the industrial establishments of the capital itself are chiefly small, with an average of 10 workers each. The trade of St. Petersburg is very considerable. Every year no less than 12,000 to 13,000 boats and nearly as many rafts, loaded with corn, hemp, flax, linseed, leather, fuel wood, and building materials, representing a total of nearly 3,000,000 tons, reach St. Petersburg via the Neva. At the same time about 1,260,000 tons of various goods, including 500,000 tons of corn, come in by rail, chiefly from the upper Volga. Large quantities of hemp, flax, linseed, leather, crude petroleum, etc., must be added to the above — the total value of the exports being from \$40,000,000 to

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\$50,000,000; the imports, chiefly of coal, machinery, groceries, and manufactured goods, reach about the same value. The port is visited every year by about 1,800 ships.

The great number and variety of scientific, literary, artistic, and technical institutions, and of institutions for higher education, which are concentrated in the capital, as well as the development of the press, render life at St. Petersburg especially attractive. Even Moscow, which down to 1848 was the intellectual center of Russia, has largely fallen from that position. The St. Petersburg University, and the numerous academies, medical, technological, engineering, naval, military, etc., as well as the Ladies' University, number several thousands of students, both male and female. The scientific societies are very numerous; the Academy of Sciences and its branches are well known to European scientists. Great facilities for work in all branches of art are afforded by the Academy of Arts; and St. Petersburg is on the whole a very musical city, with an excellent conservatoire. The public libraries are numerous. Besides the Imperial Public Library (1,200,-



BERNARDIN DE SAINT-PIERRE.

000 volumes and 40,000 MSS.), there are the libraries of the Academy of Sciences, the University, the Council of State, as well as those of the scientific societies, some of which are very rich in their special branches. There are besides rich museums of art in the Hermitage (Flemish, Russian, and early Italian schools well represented, and priceless collections of Greek and Scythian antiquities), in the Academy of Arts, and in several private collections; while the scientific museums of the Academy of Sciences, the Mining Institute, the Asiatic Museum, etc., enjoy a high repute in the scientific world. The press is represented by nearly 120 periodicals, and the greatest part of

St. Quentin

the Russian publishing trade is concentrated at St. Petersburg. Pop. (1905) 1,678,000.

St. Philip, Fort, a fortification on the Mississippi river, opposite Fort Jackson.

St. Pierre, formerly the largest town, though not the capital, of the island of MARTINIQUE (*q. v.*), W. I.; had a good harbor, a cathedral, a college, and a botanical garden. It was founded in 1665, was the birthplace of Josephine, consort of Napoleon I., and was destroyed with almost all of its inhabitants (over 20,000) by an eruption of Mont Pelée, a long-dormant volcano, May 8, 1902.

Saint-Pierre, Jacques Henri Bernardin de, a French author; born in 1737. He learned engineering, and in the capacity of engineer worked in Malta, Russia, Germany, and for about three years for the French government in Mauritius. Having returned to France he betook himself to literature. His "Studies of Nature," published in 1783, first secured him a literary position. Then followed his chief works: "Paul and Virginia" (1787) and "Indian Cottage" (1790), both of them (especially the former) very popular. He was married twice when well advanced in years, each time to a young girl. In 1795 he was admitted to the Institute. He died in 1814.

Saint-Pierre, Charles Irénée Castel, Abbé de, a French philanthropist; born in St. Pierre, Normandy, France, Feb. 18, 1658. Among his writings are: "Project of Universal Peace" (3 vols. 1713); "Polysynody," a severe stricture on Louis XIV.'s government, and a plan for the administration of the affairs of the kingdom by a system of councils for each department of the government; and a number of projects for the betterment of society in every way. He died April 29, 1743.

St. Pol de Léon, a town in the Breton department of Finistère, France, near the English Channel, 13 miles N. N. W. of Morlaix. It has a 13th-century cathedral, dedicated to St. Pol, who came hither from Cornwall in the 6th century, and also the Kreizker church, with a beautiful spire 263 feet high.

St. Quentin, a town in the French department of Aisne, on the Somme, 95 miles N. E. of Paris and 33 S. of Cambrai. The church of St. Quentin is a remarkably fine Gothic structure, dating from the 12th to the 15th century, and containing a much more ancient crypt. The town hall (15th and 16th centuries) is also a fine specimen of Gothic. The town is a center of the cotton industries, which give employment to 130,000 hands in the making of calicoes, tulle, cretonnes, jaconets, muslin, merino, cambric, gauze, and so forth. Further, vast quantities of embroidery are prepared, and machinery, hats, paper, sugar, soap, and

Saint-Réal

beer are manufactured. The French historian Martin was born here in 1810. St. Quentin and its vicinity has been the scene of two memorable battles. The Spaniards under the Duke of Savoy and Ferdinand Gonzaga, assisted by an English contingent under the Earl of Pembroke and Egmont in command of the Flemings, inflicted a crushing defeat on the French under Constable Montmorency, Aug. 10, 1557 (St. Lawrence's Day), a victory which Philip II. commemorated in the Escorial. Shortly afterward the town, after a brilliant defense by Coligny, capitulated to the Spanish army. On Jan. 19, 1871, the Germans under Von Goeben put to rout the army of Faidherbe, capturing nearly 10,000 prisoners. Pop. (1906) 52,778.

Saint-Réal, César Richard, Abbé de, a French historian, called "the French Sallust"; born in Chambéry, France, in 1639. He was official historian of Savoy, and wrote a "History of the Spanish Conspiracy of 1618 against the Republic of Venice" (1674), his principal work. His historical novel, "Don Carlos," is the chief source of Schiller's drama of that name. His works have been often reprinted (8 vols. 1757). He died in Chambéry in 1692.



ST. REMY MONUMENT.

St. Remy, a town in the department of Bouches-du-Rhône, France; 14 miles N. E. of Arles. Near it are antiquities from the Roman town of Glanum Livii. The most noteworthy are the triumphal arch, A. D. 100, and the tomb, or monument, of the Julii. The latter is about 60 feet high,

Saintsbury

rising two stories above the square base. Around the base is a series of military scenes in relief; the first story is pierced by archways, and decorated with Corinthian semi-columns; and the second story is a circular edicule with 10 Corinthian columns and a domical roof sheltering two statues. This monument is assigned to the time of the early empire.

Saint-René Taillandier. See TAILLANDIER.

St. Rule. See REGULUS.

Saint-Saens, Charles Camille, a French musician; born in Paris, France, Oct. 9, 1835. At the age, it is said, of two and a half years he was taught the pianoforte by his great-aunt, and at seven he had further instruction from Stamaty, and subsequently learned harmony under Maleden. In 1847 he studied the organ under Benoist. At the age of 16 he wrote his first symphony, which was performed with success, and was followed by numerous other instrumental works. He became organist, first of the church of St. Méry, and in 1858 of the Madeleine, where he continued till 1877. His first opera, "The Yellow Princess," was given in 1872, and "The Silver Bell" in 1877; but neither was successful. "Samson and Dalila," a sacred drama, was produced at Weimar also in 1877, and was subsequently successfully revived at Rouen. More important operas are: "Henry VIII.," brought out in 1883 at the Grand Opéra with success, not however extending to its subsequent revivals; "Proserpina," given in 1887, but received with disapprobation; and "Ascanius," produced at the Grand Opéra, March 21, 1890, and well received, though not with unmixed praise; "The Barbarians" (1901). He was one of the greatest performers on the piano and organ, and had remarkable powers of improvisation. He appeared as a performer in various countries. His reputation as a composer is high, though he has not attained the highest rank in opera; many of his instrumental works, however, which include three symphonies, four symphonic poems (in which he follows the lead of Liszt), two orchestral suites, several concertos for piano and orchestra, and violin and orchestra, and, above all, a considerable quantity of chamber music, show the most consummate mastery, if not genius. He was a distinguished musical critic.

Saintsbury, George Edward Bateman, an English littérateur; born in Southampton, England, Oct. 23, 1845; was educated at King's College School, and Oxford. From 1868 till 1876 he filled scholastic appointments at Manchester, Guernsey, and Elgin, but soon after established himself in the literary world of London as one of the most active and influential critics of his day. He was an active contributor to the greater

magazines (of "Macmillan's" he was for some time editor) and to encyclopædias. Among his books are a "Primer" (1880) and a "Short History" (1882) of French literature; "Dryden" in "English Men of Letters" (1881), and "Marlborough" in "English Worthies" (1885); a "History of Elizabethan Literature" (1887); a short history of "Manchester" (1887); "Essays in English Literature, 1780-1860" (1891); "Essays on French Novelists" (1891); "Short History of English Literature" (1898); "Matthew Arnold" (1899); etc. Besides these he edited Scott's "Dryden" "Specimens of French Literature, from Villon to Hugo" (1883); "Specimens of English Prose Style, from Malory to Macaulay" (1885); Corneille's "Horace," and other French classics for schools; and a translation of Scherer's "Critical Essays on English Subjects" (1891). In 1895 he became Professor of Rhetoric and English Literature at Edinburgh University.

Saints' Days, days set apart by traditional usage or authority of the Church for anniversary celebrations in honor of particular saints. They were first instituted in honor of martyrs. See FESTIVALS.

St. Sebastian, a celebrated Roman martyr; born in Narbonne about 255. According to the anonymous "Acts" by which his



ST. SEBASTIAN.

history is preserved (supposed to have been written in the 4th century, and by some attributed to St. Ambrose), he was a captain in the prætorian guard under Diocletian, and used the facilities afforded by his station to propagate the Christian faith and to succor its persecuted professors. Having refused to abjure his religion, he was tied to a tree, shot with arrows, and left for dead. A Christian woman, seeking his body by night, found him still alive, and cared for him till he was restored; but, having ventured to appear before Diocletian to remonstrate against his cruelty, he was beaten to death with clubs, and his body thrown into a sewer, but afterward recovered and interred. In the 9th century his relics were distributed throughout Christendom as a remedy against the plague. His martyrdom was the subject of many poems and paintings in the Middle Ages; in the latter he is generally represented tied to a tree and pierced with arrows. He died in Rome, Jan. 20, 288.

St. Servan, a seaport of France, department Ille-et-Vilaine, on the E. side of the estuary of the Rance, just above ST. MALO

(q. v.), from which it is separated by a creek a mile wide. It has a floating dock, is much frequented as a watering place, and carries on shipbuilding and its cognate branches, and has a little commerce in fruit, potatoes, barley (exports), coal, and timber (imports). Close by are the ruins of the cathedral of Aleth (6th to 12th century). Pop. (1901) 12,597.

Saint-Simon, Claude Henri, Comte de, a French social philosopher, the founder of French socialism; born in Paris, France, in 1760. After completing his education he entered the army, and in 1777 was included in an expedition sent by Louis XVI. to assist the United States in her war with England. After seeing some service under Washington, and traveling through Mexico, he returned to France and was appointed colonel in the French army. He, however, took no interest in his military duties, as he intended to devote his life to the advancement of human civilization. On the breaking out of the Revolution, though he warmly sympathized with the movement, he took no part in the subsequent events, but retired entirely from the army, and bought a considerable quantity of confiscated land, with the view of establishing a large scientific and industrial school; but the scheme was a failure, and St. Simon retired from it after losing a vast sum of money. From this time he devoted himself to what he termed a "physico-political" reformation, for which purpose he entered into the study of all the physical sciences—mathematics, astronomy, general physics, and chemistry,—and all the general science attainable with respect to organized beings. He next proceeded to make his "experimental education"; he married and continued to pursue his prescribed career, in which good and evil were confounded. This, however, in 1807, came to an end; his fortune was gone, and he was compelled to become a clerk in a government office at a small yearly salary. In 1812, he being then in his 52d year, he considered it time to "establish his theory," and published a number of remarkable works which attracted round him a large number of disciples. His last efforts were directed toward the foundation of a new religion, which he called the New Christianity, in which society was to be reorganized on this formula: "To each man a vocation according to his capacity, and to each capacity a recompense according to its worth." Before breathing his last he gave final instructions to his chief disciples, among whom were Augustine Thierry and Comte, the future author of the "Positive Philosophy." His most important works were, "Introduction to the Scientific Labors of the Nineteenth Century"; "The Reorganization of European Society"; and "New Christianity." He died in 1825.

Saint-Simon, Louis de Rouvroy, Duc de, a French writer; born in 1675. He was brought up on terms of intimate friendship with the Duke of Orleans, and when the latter became regent he was appointed a member of the regency council. From 1692 to 1702 Saint-Simon served in the army. He possessed the esteem and to some extent the confidence of Louis XIV. and of the Duke of Orleans, but his spirit of independence, severe morality, and peculiar views about the mission of the aristocracy, made him unpopular at the court. Nevertheless he succeeded in getting himself well informed about all the court cabals, and the doings and sayings of almost every notable personage of the France of the period. This information he deposited in his "Memoirs," published posthumously, and which have made him famous. The first complete edition appeared in Paris in 1829-1831. He died in 1755.

St. Sophia, Church of. See SOPHIA, CHURCH OF ST.

St. Stephen, THE DEACON, called also the "protomartyr," or earliest of the Christian martyrs; one of the seven deacons whose appointment is related in the 6th chapter of the Acts of the Apostles. The circumstances of his martyrdom are related in the same chapter. His festival is fixed during those which accompany that of Christmas.

St. Swithin. See SWITHIN, ST.

St. Teresa. See THERESA, ST.

St. Theresa. See THERESA, ST.

St. Thomas, a volcanic island of Africa belonging to Portugal; in the Gulf of Guinea; 170 miles W. of the mouth of the Gabun river. Its S. extremity almost touches the equator. Measuring 32 miles by 21, it has an area of 360 square miles; pop. nearly 20,000, including 1,000 whites. Though it rises to the altitude of 6,000 feet, it has the reputation of being very unhealthy. Coffee and cocoa, with some pepper, cinnamon, maize, indigo, etc., are the principal products. Chief town, St. Thomas, on the N. E. coast, the seat of a bishop. The island was discovered in 1470, and colonized in 1493 by the Portuguese, to whom it reverted after a Dutch occupation from 1641 to 1844.

St. Thomas, one of the Virgin Islands, West Indies, belonging to Denmark; 36 miles E. of Porto Rico; area, 33 square miles. English is the language of the educated classes. The surface is hilly and the soil poor. The cultivation of vegetables, guinea grass, and a small quantity of cotton employs the scanty rural population. The port, Charlotte Amalie or St. Thomas, was formerly a busy emporium for the European trade of the West Indies, the harbor in which the merchant fleets assembled to wait for their convoys, and later the principal port of call in the West Indies.

All these advantages have now passed from it. Before the abolition of slavery it was covered with prosperous sugar plantations. The island is often visited by earthquakes, but they are not, as a rule, so destructive as the cyclones. It was first colonized by the Dutch in 1657. The British held it in 1667-1671, 1801, 1807-1815; and the United States sought to acquire it by purchase, with the entire Danish West Indies, in 1902.

St. Thomas, a city of Ontario, Canada, and the county-seat of Elgin co.; on Kettle creek, and on the Michigan Central, the Canadian Pacific, the Grand Trunk, and other railways; 75 miles S. W. of Hamilton. It is a divisional point on these railways. The leading business street is Talbot street. The chief residential streets are Wellington, Metcalfe, Forest, Erie, Rosebery, Curtis, Scott, Pearl, and Hiawatha. The most prominent buildings are the city hall, court house, post office, Alma Ladies' College, public library, Amasa Wood Hospital, and the Collegiate Institute. The five public schools are housed in fine buildings. Pinafore park contains 60 acres; Waterworks park 20 acres. There are two Anglican, three Methodist, and two Presbyterian churches, and one Baptist, one Roman Catholic, one Christian, and one of the Latter Day Saints. The educational and charitable institutions include Alma Ladies' College, Sinclair College, Amasa Wood Hospital, Thomas Williams Home for the Aged, and Children's Home. There are an opera house and two daily newspapers, the "Times" and the "Journal."

Business Interests.—The city is situated in a very fertile district noted for grain crops, dairying, and live stock. The leading manufactures are brass goods, machine-shop and foundry products, handles, flour, and canned goods. The large car shops of the Michigan Central railway, employing 600 men, are situated here. According to the Dominion census the value of manufactured products for 1906 was \$2,213,503. The city owns and operates the water works, street railway, gas works, and electric lighting plants. The city's assets in 1906 were \$998,211; its liabilities, \$790,961. Pop. (1901) 11,485; est. (1907) 14,000.

St. Thomas. See THOMAS, ST.

St. Ursula. See URSULA, ST.

St. Valentine's Day, the 14th day of February, dear to the hearts of all youth. It is said that a fact in natural history, to wit, that birds in southern Europe pair about the middle of February, is the actual origin of the association of sentiment with this date. There is no doubt that the custom of sending valentines can be traced in origin to the ancient Romans.

St. Valentine was a bishop of Rome during the 3d century. He is reported to have

St. Valentine's Day

been a man of most amiable nature and remarkable gifts of eloquence, so that he was very successful in converting the pagan Romans to Christianity. For this reason he naturally incurred the displeasure of the Emperor Marcus Aurelius Claudius, who hated and persecuted the little Christian band, and he was martyred by order of that ruler, first beaten with clubs and then beheaded. The date of his death was Feb. 14, 270. His bones are still exhibited to the credulous traveler at the Church of St. Praxedes, in Rome. Pope Julius erected a church to this worthy martyr's memory, and the gate leading to it, which is now the Porta del Popolo, was known for several centuries as Porta Valentini. Archbishop Wheatley, in his "Illustrations of the Book of Common Prayer," says that "St. Valentine was a man of admirable parts, and so famous for his love and charity that the custom of choosing valentines on this festival (which is still practised) took its rise from thence." It is probable that the connection of name came from a coincidence of date only. When the saint came to be placed in the calendar, his name was given to the day of his death, and this was made a festival, to offset that of the Lupercalia, on the 15th.

Alban Butler, in his "Lives of the Saints," tells us that the zealous fathers endeavored to substitute the names of saints for those of girls in this lottery, but without success. St. Francis de Sales, of Geneva, in the 17th century attempted a similar reform, ordering the drawing of the names of saints and holy men whose virtues were deserving of imitation. Since imitating a saint is a more difficult task than dancing attendance on a pretty girl, we cannot be surprised that the innovation did not "take," among the young men of Geneva. By some means this custom found its way into Great Britain, and was for many centuries in high favor both in England and Scotland. We find mention of it at as early a date as 1446 and many times subsequently. It was called "chusing valentines"; probably because there was no choice in the matter. Here the young men as well as the young women wrote their names on billets to be drawn by the opposite sex. Thus each had two valentines, the one which he had drawn, and the one to whose lot he had fallen, and we are told it was the custom for the young man to prefer the former and to relieve himself from all obligations to the latter by a gift. Fortune having thus divided the company into couples, it was expected that the young men would devote themselves for a certain length of time to attendance on the maidens given them, "a sport which often ends in love," an old writer says, "as might be expected." Indeed, matrimony might be chosen by the young man from motives of

St. Vincent

economy, for he was expected to be lavish of gifts to his "valentine." Many other customs of mediæval and later times might be noted, all having this large admixture of sentiment, which, unquestionably of purely secular, even pagan origin, have become by accident allied in name to a holy saint of the Church.

St. Veronica. See VERONICA.

St. Victor, Hugo of, a Flemish theologian; born near Ypres, in 1097. He became prior of the Augustinian monastery of St. Victor at Paris, was a man of the school of Bernard of Clairvaux, and a mystic, his favorite teaching being that the intellect or its exercise, reasoning, will never enable man to discover the "uncorrupted truth of things." His writings were very popular in the monastic schools and in pietistic circles during the Middle Ages. He died in 1141. His pupil, RICHARD OF ST. VICTOR, prior of his monastery from 1162 to 1173, and a Scot by birth, went even further than Hugo in that he proclaimed mystic contemplation to be above reason.

Saint-Victor, Jacques Benjamin Maximilien, Count de, a West Indian author; born in Fort Dauphin, San Domingo, Jan. 14, 1770. He was connected with the "Journal des Débats" under Napoleon, and established several Roman Catholic and Royalist magazines. His writings include: "Paris from the Time of the Gauls to our Own Day" (3 vols. 1808-1812); "Poetic Works" (1822); "Letters on the United States, Written in 1832-1833" (2 vols. 1835); and "Journal of Travel" (2 vols. 1836). He died in Paris, France, Aug. 8, 1858.

Saint-Victor, Paul Binsse, Count de, a French literary and art critic and journalist; born in Paris, France, July 11, 1825. He rose to distinction first through his weekly critiques of the stage and of the annual exhibitions of fine art. His two principal works are: "Men and Gods" (1867; 4th ed. 1872), a volume of historico-æsthetic studies, among which the essay on "The Venus of Milo" merits special mention; and "The Two Masques: A Tragedy-Comedy" (3 vols. 1880-1883), an uncompleted work on the ancient and the modern stage. He wrote also: "The Women of Goethe" (1869); "Victor Hugo" (1885); "Ancients and Moderns" (1886); "The Theater of To-day: E. Augier and A. Dumas fils" (1889). He died in Paris, July 9, 1881.

St. Vincent, one of the British islands in the West Indies, Windward Group, 105 miles W. of Barbadoes; area, 132 square miles; pop. (1901) 44,500, of whom over 3,000 were whites and Hindu coolies, the rest being negroes and people of mixed blood. The island is traversed from N. to S. by a chain of volcanic mountains, which rise in the volcano called the Souf-

frière to 3,000 feet. Many of the valleys are fertile, and the shores are rich and productive. Only one-seventh of the entire area is under cultivation. The climate is healthy. Sugar, rum, cocoa, spices, and arrowroot are the principal products. The chief town is Kingstown (pop. 6,000), at the head of a bay on the S. W. coast. The island is ruled by a governor and a nominated legislative council of eight members; previous to 1877 it had a representative government. St. Vincent was discovered by Columbus in 1498, and was then inhabited by Caribs. These people were left in possession down to 1783, although Charles I. gave the island to the Earl of Carlisle in 1627. In 1797 the Caribs, rebelling with French aid, were transferred to the island of Rattan in the Bay of Honduras.

St. Vincent, Cape, a promontory forming the S. W. corner of Portugal, off which several important naval battles have taken place. On June 16, 1693, the English Admiral Rooke was here attacked by a superior French fleet, and defeated with the loss of 12 men-of-war and 80 merchantmen which were sailing under his convoy; on January 16, 1780, Admiral Rodney destroyed here several Spanish ships of Langara's fleet; on February 14, 1797, the great battle of Cape St. Vincent resulted in the total defeat of the Spaniards and capture of some of their largest ships. This victory frustrated the formidable Spanish-French scheme of invading England. The fourth naval fight off Cape St. Vincent took place between the fleet of Queen Maria of Portugal, commanded by Sir Charles Napier, and that of Dom Miguel, in which a portion of the latter was destroyed and the rest captured July 5, 1833.

St. Vincent. See VINCENT, ST.

St. Vincent, John Jervis, Earl of, an English naval officer; born in Meaford Hall, Staffordshire, England, Jan. 9, 1734. Running away to sea as a boy, he rose to be a naval lieutenant in 1754, and so distinguished himself in the Quebec expedition in 1759 as to receive the rank of commander. As captain of the "Foudroyant" in 1778 he fought in the action off Brest, and in 1782 captured the "Pégase" of 74 guns, whereupon he was made K. C. B. In 1793 he commanded the naval part of the successful expedition against the French West India Islands. In 1795, now admiral, he received the command of the Mediterranean fleet. On Feb. 14, 1797, with only 15 sail of the line and seven frigates, he fell in, off Cape St. Vincent, with the Spanish fleet of 27 sail. Jervis determined to engage the enemy, and the battle of St. Vincent was fought; but it should be remembered that the genius of Nelson contributed greatly to the success of the day (see NELSON, HORATIO). For this victory the king cre-

ated Jervis Earl St. Vincent, and Parliament settled on him a pension of \$15,000 a year. After having, by great firmness, repressed a mutiny off Cadiz which threatened the loss of the whole fleet, he was compelled by ill-health to return home. He subdued the spirit of sedition which had openly manifested itself in the Channel fleet; held the appointment of First Lord of the Admiralty 1801-1804; reformed innumerable crying abuses; having for a second time commanded the Channel fleet, retired into private life, and died March 13, 1823. He was buried in St. Paul's Cathedral.

St. Vincent de Paul. See VINCENT DE PAUL, ST.

St. Vitus. See VITUS, ST.

St. Vitus' Dance. See CHOREA.

St. Vladimir. See VLADIMIR, ST.

St. Wilbrod. See WILBROD, ST.

St. Winifred. See WINIFRED, ST.

Sais, an ancient Egyptian city, on the right bank of the Canopic branch of the Nile. It gave its name to two Egyptian dynasties, the 24th and 26th, founded by natives of the city. Sais was important as a religious capital, and had a famous temple of the goddess Neith and the tomb of Osiris. Toward the decline of the monarchy it rose to great splendor. The 26th dynasty transferred hither the capital of the kingdom. It was also a renowned seat of learning, and was frequently visited by the sages of Greece. The legend of the mysterious veiled statue in the temple at Sais (which formed the subject of Schiller's ballad and of Novalis' romance) is the issue of Greek invention.

Saivas, the name of one of the three great divisions of Hindu sects. The word designates the votaries of Siva, and comprises different special sects which varied in number at different periods of mediæval Hinduism. See SIVA.

Sajou, a lively and active monkey, of the *Cebidæ*, genus *Cebus*; docile, but somewhat capricious. It has a prehensile tail, though it is not so delicate an organ of touch as in some other species. In their native forests they live in troops, feeding on fruits, grain, eggs, etc.

Sajous, Charles Euchariste de'Medici, an American physician; born at sea Dec. 13, 1852; was graduated at Jefferson Medical College in 1878; became dean and professor there, and later accepted the chair of anatomy and physiology in the Medico-Chirurgical College, Wagner Institute of Science. His publications include "Curative Treatment of Hay Fever" (1884); "Diseases of the Nose and Throat" (1885); etc. He was also editor of "Sajous' Annual and Analytical Cyclopædia of Practical Medicine" (6 vols. 1898-1900), and

"Sajous' Annual of the Universal Medical Sciences" (5 vols. 1888-1896).

Sakai, a town of Japan, on the S. W. of the island of Nippon; 7 miles S. of Osaka. Before the rise of this town Sakai was the chief commercial port of Japan; its trade is now absorbed in that of Osaka. Pop. (1908) 61,103.

Sakhalin, a long island in the North Pacific, separated from Manchuria by the Gulf of Tartary, opposite the mouth of the Amoor; area, 24,560 square miles. The center is mountainous. There are three parallel ridges running from N. to S., from 2,000 to 5,000 feet above sea-level, and densely covered with conifers. Climate, flora, and fauna are almost Siberian. The island formerly belonged to the Chinese empire, but early in 19th century the Japanese took possession. In 1875 the Russians obtained its cession from Japan. The principal depot is at Alexandrovsk. Pop. about 16,000, consisting of Ainós and other aborigines, Russians, Japanese, etc.

Sakhara, a village of Egypt, where is the necropolis of ancient Memphis. It is remarkable for its ancient monuments, pyramids, etc.

Sakhrat, in Mohammedan mythology, a sacred stone of an emerald color, which, by reflection, imparts the azure hue to the sky. If one possess the smallest fragment of it he acquires miraculous powers.

Saki, a monkey, called also fox-tailed monkey, belonging to the *Cebidæ*, genus *Pithecia*. These animals usually reside in the outskirts of forests, in small societies of 10 or 12 individuals. On the slightest provocation they display a morose and savage temper; and, like the howlers, they utter loud cries before sunrise and after sunset.

Saki, or **Sake**, the native beer and common stimulating drink of the Japanese. It is made from rice, and is drunk warm, producing a very speedy but transient intoxication.

Sakieh, **Sakia**, or **Sakeeyeh**, a machine used in Egypt for raising water from the Nile for the purpose of irrigation. It is a modification of the Persian wheel, and consists of a series of cogged wheels, turned by a buffalo or camel, each revolution of the wheel working up a series of earthen pitchers which empty themselves into a trough or pool.

Sakinara, a river of Asiatic Russia, rising in the Ural Mountains, and after a S. course of 350 miles, joining the Ural river, 20 miles S. E. of Orenburg.

Sakta, in Hinduism, a worshiper of the Sakti, the power or energy of the divine nature in action, and personified in a female form. If the proclivities of the worshiper are toward the adoration of Vishnu, then the personified Sakti is termed Laksh-

mi or Maha-Lakshmi; if it be toward that of Siva, the Sakti is denominated Parvati, Bhavani, or Durga. The principal religious books of the Saktas are the Tantras (see TANTRA). It is believed that at least three-fourths of the Hindus of Bengal are of this sect, and of the remaining fourth, three are Vaishnavas to one Saiva. Wilson divides the Saktas into Dakshinis, Vamis, Kanchelias, and Kararis. Another classification is into the Dakshinacharis and the Vamacharis, followers of the Right Hand and of the Left Hand Ritual. The latter are accused of great immoralities.

Sakuntala, one of the most pleasing female characters of Hindu mythology. She is mentioned as a water nymph in the "Yajurveda"; is the subject of a beautiful episode of the "MAHÁBHÁRATA" (*q. v.*), and is spoken of in the "Purānas"; but her name has become especially familiar in Europe and the United States through the celebrated drama of KÁLIDÁSA (*q. v.*), which, introduced by Sir William Jones in 1789, became the starting point of Sanskrit philology in Europe.

Sákyamuni, or the "Saint Sákya," a name of the founder of the Buddhist religion. See BUDDHISM.

Sal (*sal*), one of the most valuable timber trees of India, *Shorea robusta*, natural order *Dipteraceæ*, growing to the height of 100 feet. Extensive forests of it exist in Northern India, where it is largely used in carpentry of all kinds, the wood being light brown in color, hard, and uniform in texture. It yields a whitish, aromatic, transparent resin (sometimes called dammar), used to caulk boats and ships, and also for incense. The *sâl* forests are now protected by government.

Sala, **George Augustus Henry**, an English journalist; born in London, England, in 1828; early became a contributor to "Household Words"; was the founder and first editor of the "Temple Bar Magazine"; visited the United States as a correspondent of the London "Daily Telegraph" in 1863; went to Algeria in the same capacity in 1864; and was a war correspondent during the Franco-Prussian War in 1870. For several years he edited "Sala's Journal", and having published in its columns in 1892 an attack on the Domestic Servants' Union, was subsequently attacked and mobbed in Hyde Park. He acquired a large fortune in journalism, but was recklessly extravagant and finally became bankrupt. His writings include: "La Belle Alliance"; "A Journey Due North"; "My Diary in America in the Midst of War"; "From Waterloo to the Peninsula"; "My Life and Adventures"; etc. He died in Brighton, England, Dec. 8, 1895.

Salaam, the general term of salutation among the Mohammedans. Several of their

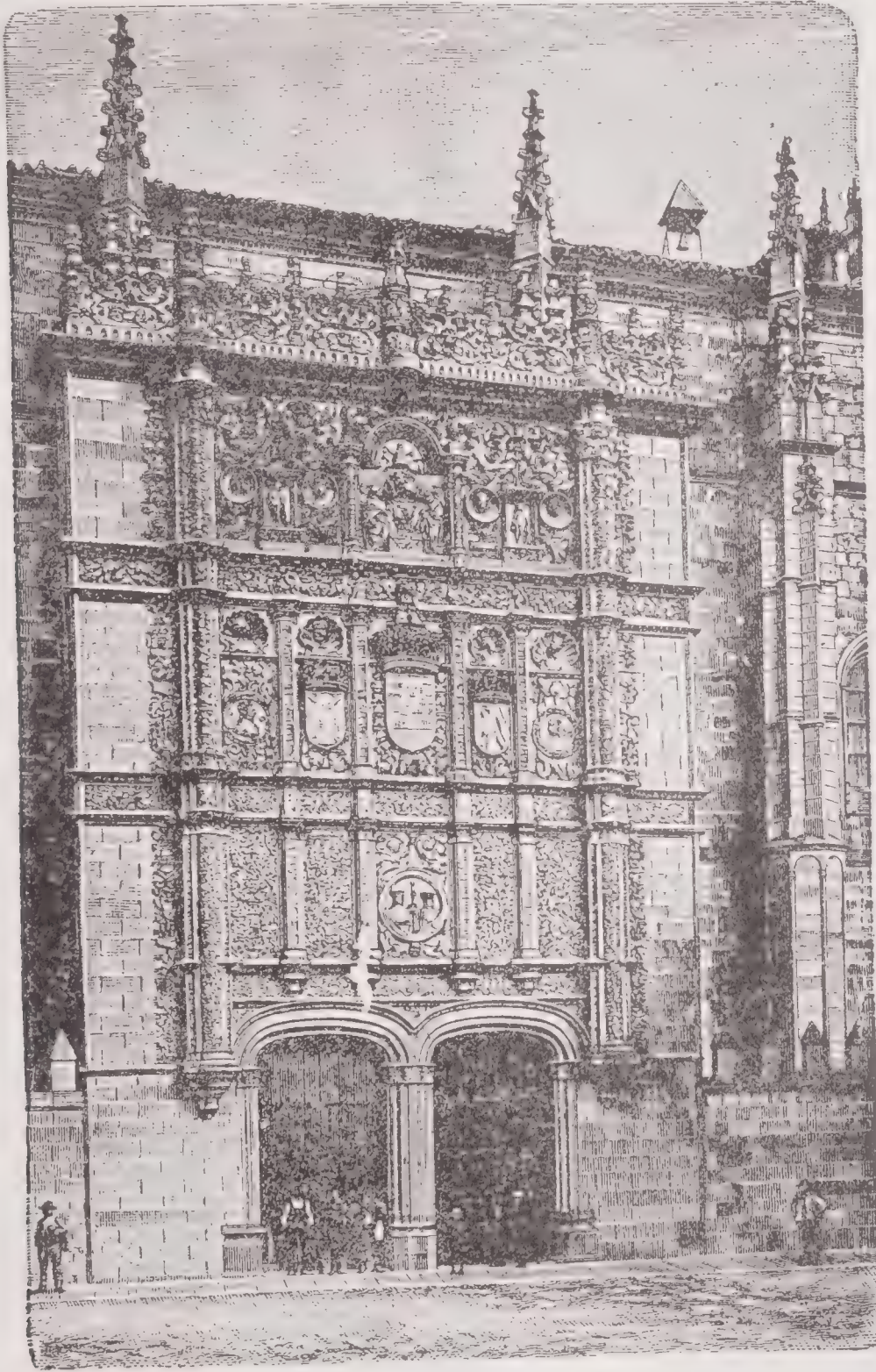
Salad

social usages in this respect are founded on religious precepts; among these is the custom of greeting each other with the words "Es-selāmu aleikum" ("Peace be with you"), which is answered by "With you be peace, and the mercy of God, and His blessings!" This salutation is neither to

Saladin

Salade, or **Sallet**, a light kind of helmet introduced during the 15th century, chiefly for the use of foot-soldiers.

Saladin, or **Salaheddin**, a celebrated Sultan of Egypt and Syria; born in 1137. In the time of the Crusades he distinguished himself by his valor. He made great con-



SALAMANCA: FRONT OF THE UNIVERSITY.

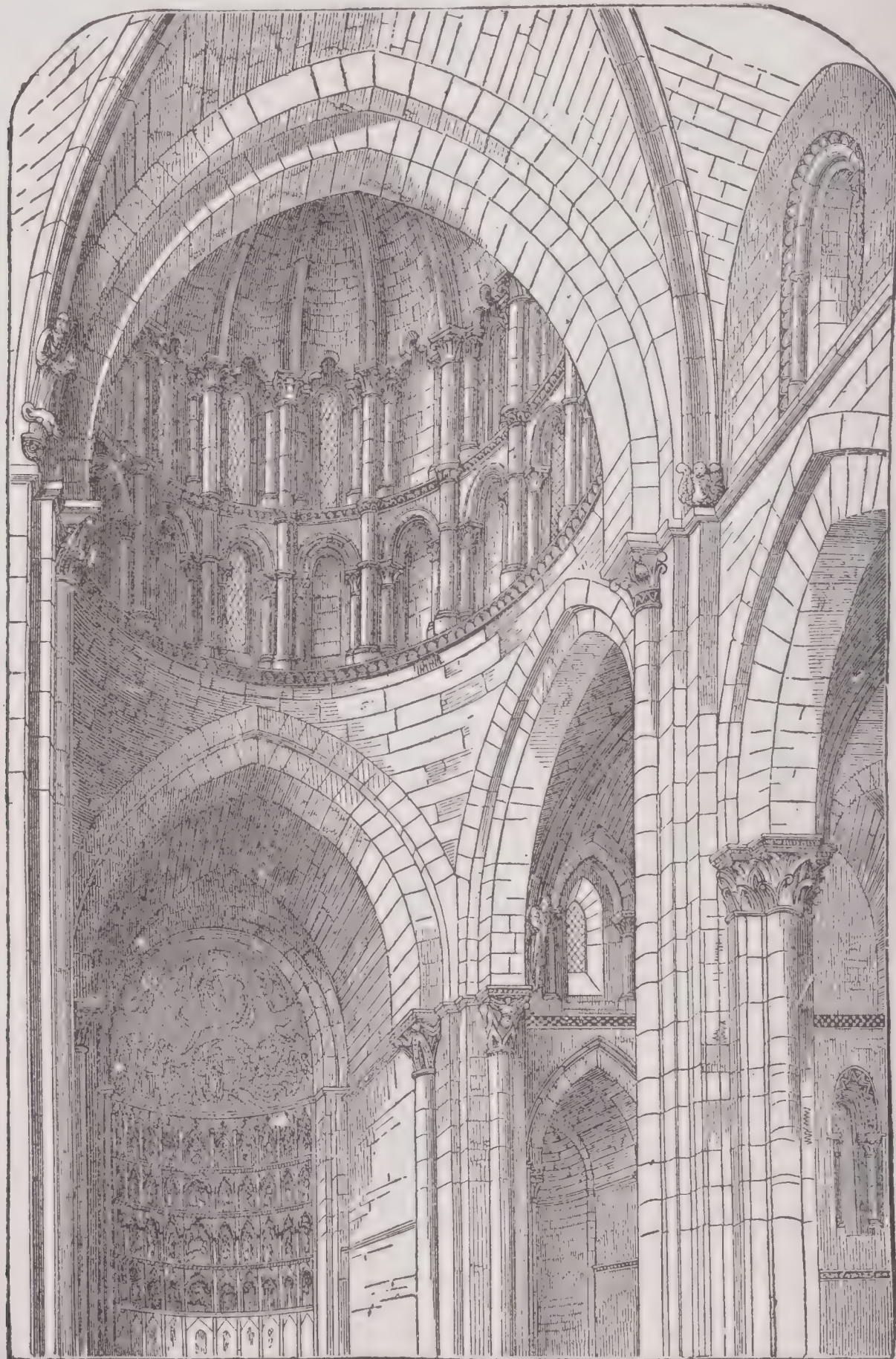
be addressed to nor to be received from any non-Mohammedan.

Salad, generally, a dish of certain vegetables prepared and served so as to be eaten raw; specifically, a dish of lettuce, endive, radishes, mustard, land and water cress, celery, and young onions, dressed with eggs, salt, mustard, oil, vinegar or spices. Also a dish composed of some kind of meat, as chicken or lobster, chopped and mixed with uncooked herbs, and seasoned with some condiment, as lobster salad.

quests in Syria, Arabia, Persia, and Mesopotamia; after which he defeated the Christians with great slaughter near Tiberias and took Guy de Lusignan, King of Jerusalem, prisoner. This was followed by the surrender of Jerusalem, where he behaved with great generosity to the Christians. In 1189 Richard Cœur-de-Lion, with his ally, Philip Augustus, King of France, laid siege to Acre, which, after a two years' struggle, was taken by them. The crusaders subsequently took Cæsarea and Jaffa,

and Richard Cœur-de-Lion advanced to within a short distance of Jerusalem; but a truce was afterward concluded between Saladin and the Christians; soon after

and Philip Augustus of France against Saladin, Sultan of Egypt. It was a tenth on every one's annual income, and on his movable goods except his clothes, books and



SALAMANCA: AN INTERIOR OF THE CATHEDRAL.

which the Sultan died, broken down by his constant toil. He died in Damascus in 1192.

Saladine Tenth, a tax imposed on England and France in 1188 by Pope Innocent III., to obtain money for the crusade then about to be led by Richard I. of England

arms. Some religious orders were exempt. The tax was continued after the crusade was at an end, and became the ground for the taxing of ecclesiastical benefices for the Pope. The example was ultimately imitated by various sovereigns.

Salal Berry, the fruit of *Gaultheria shallon*, growing in the valley of the Oregon,

Salamanca

about the size of a common grape, of a dark-purple color, and of sweet, pleasant flavor.

Salamanca, a city of Spain; on and between four low hills beside the river Tormes, 110 miles N. W. of Madrid. From the middle of the 13th to the close of the 17th century it was the seat of one of the most celebrated universities in Europe. Founded in 1243, this great school won renown at first for the teaching of civil and canon law; later theology became an important faculty. In the 16th century there were here from 6,000 to 8,000 students, among them the members of an Irish College; at the present day there are not more than 400. The university buildings date chiefly from the 15th century and are Gothic in style. In Salamanca's palmy days her population reached 50,000, and the university counted more than a score of colleges. The library, founded in 1254, contains over 70,500 volumes and 870 MSS. The city is still surrounded with walls, pierced by 10 gates, and preserves very much of its



SALAMANCA: THE CITY HALL.

mediæval appearance, its houses, convents, and churches, its streets and squares having altered but little since the university began to decline. The river is crossed by a bridge of 27 arches, in part of Roman construction. The great square is the largest perhaps in Spain; it is surrounded by an arcade, and has on one side the municipal buildings. It was used for bull fights, and can hold 20,000 spectators. The city possesses two cathedrals; the old cathedral, cruciform in shape, late Romanesque in style, and dating from the 12th century, is richly decorated with paintings and monuments; the new

Salamander

cathedral (1513-1734) is a florid Gothic pile, also richly decorated. Among the remaining noteworthy buildings are the Jesuit College (1614), Renaissance in style; the Old College, now the governor's palace; the convents of the Dominicans and the Augustinians, the churches of which are both elaborately ornamented. In the Middle Ages Salamanca was famous for its leather work; at the present day it has not much industry save a little manufacture of cloth, linen, leather, and pottery. The town was captured by Hannibal in 222 B. C. The Moors were expelled from its walls in 1055. During the Peninsular war it was taken by the French (1812), who committed great destruction in one of its quarters, and in the vicinity Wellington defeated Marmont on July 22, 1812. Pop. (1900) 25,690.

Salamander, a genus of reptiles closely allied to the frog, from which it differs in having an elongated body terminated by a tail, and four feet of equal length. There are no gills in the adult animal, and the tympanum is also wanting. The jaws are armed with numerous small teeth; and there are two longitudinal rows on the palate. The third eyelid is wanting. Together with the frog, this genus is included under the order *Batrachia*, and is easily distinguished from the lizards by having no nails on the toes, a naked skin destitute of scales, and a heart with a single auricle. The young are born in the shape of tadpoles, are provided with gills, and have their tails vertically compressed. The land salamanders inhabit the water only during the tadpole state, or during the time that they are laying their eggs; they are distinguished by a rounded tail. The aquatic species remain during life in water, and are enabled to swim with considerable briskness by means of their compressed tails; sometimes, however, they quit the water at night, and when unable to regain it have been found in similar situations with the terrestrial species. They are endowed with an astonishing power of reproduction; and, when mutilated, their limbs, tail, and even their eyes, are restored at the end of two or three or six months, in warm climates, or a longer period in cold ones; and no difference of organization can be discovered on dissection. They may be suffocated in the same manner as frogs, by forcibly holding open the mouth.

The common salamander of Europe has been celebrated from antiquity for its supposed power of braving the fiery element. It is almost unnecessary to observe that this quality has been attributed to it without the slightest foundation; still the belief is not entirely eradicated among the common people, and the salamander continues to be an object of superstition in

Salamander

the eyes of many. It is a sluggish, clumsy reptile, six or eight inches long, of a blackish color, with large irregular rounded spots of bright yellow. It is found throughout Europe in moist places, under stones or the roots of trees, near the borders of springs, in deep woods, etc., and passes its life under ground except during rains or at night, when it comes out, but does not wander from its place of residence. It lives on slugs, insects, worms, etc., and, when met with, seems stupid, and does not appear to shun the presence of man or other animals. The skin exudes a mucous and acrid secretion in great abundance. It is oviparous.

It would seem that the United States produce a greater variety of salamanders than any other part of the globe. Our species are, however, far from being well understood; and probably more remain to



GIANT SALAMANDER.

be discovered. What we know of them is chiefly contained in the "Journal" of the Academy of Natural Sciences of Philadelphia. We shall particularize the following, among the land salamanders: *S. subvioletacea*, a large stout species, seven inches or more in length; blackish, with two rows of large, round, whitish spots on the back, becoming single on the tail; a few similar spots on the legs. It resembles the common salamander of Europe. *S. fasciata*; green; less than the preceding; blackish, with transverse bluish-white bands on the back; found from New Jersey to South Carolina, but rare. *S. glutinosa*; green; a more slender species, with the tail nearly twice the length of the body; blackish, sprinkled on the upper parts of the body with white specks; length about six inches.

It is found in most parts of the United States, and as far N. as lat. 43°. *S. longicauda*; green; whitish, with numerous black specks; the tail longer in proportion than in any other species; total length six inches. It is found in the Atlantic States, but is more frequently met with in the limestone caves of the West. *S. bilineata*; green; a small slender species; above brown, beneath yellow, with two or sometimes three indistinct black lines; the tail is longer than the body and compressed toward the extremity. It inhabits New England and the Middle States and seems to be more brisk and lively in its motions than the other terrestrial species. *S. cirrigera*; green; a species somewhat resembling the preceding in the distribution of its colors, but remarkable for having two short, fleshy cirri on the snout. It was found in the vicinity of New Orleans. *S. erythronota* (the most common species); blackish, with a broad red stripe on the back. The young are destitute of the red stripe, and in some full-grown individuals a small portion only is observable, or it is even entirely wanting. *S. symmetrica* (Harlan); reddish, with a row of bright orange ocellated spots on each side; length about three inches. The skin of this animal is rough, and apparently destitute of the mucous secretion common to the other species; the back is elevated, and the tail somewhat compressed. An aquatic species, resembling it precisely, except in having the color of the back browner, and the tail much more compressed, is frequently met with; and perhaps the difference is only sexual—one of our more common species.

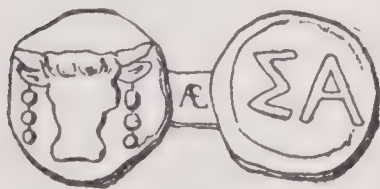
Among the aquatic salamanders we shall particularize. *S. dorsalis* (Harlan); resembling the preceding in size and the general distribution of the colors; but the ocelli are irregularly elongated, and sometimes form an almost continuous line, and there is a pale line on the back; the skin is smooth; the tail very much compressed, forming a distinct edge above and below; inhabits South Carolina. *S. maculata*; green; a stout species; whitish, with numerous round specks of a reddish brown color; tail about as long as the body, and slightly compressed; grows to the length of five inches or more. *S. ingens*; green; by far the largest species hitherto known; nearly a foot in length. It was discovered in the vicinity of New Orleans.

This is perhaps the most appropriate place to speak of several very singular North American animals allied to the salamander: *Menopoma alleghaniensis*, an animal of disgusting appearance, with a broad flattened head, bearing a general resemblance to a salamander, but much larger than any except the *S. ingens*. It appears to be destitute of gills at all periods of its

existence. It is found in the Ohio and other W. rivers, and is commonly called ground puppet, mud devil, young alligator, etc. *Menobranhus lateralis* resembles the preceding in form, but the gills persist during life; an indistinct blackish band on each side. It attains the length of one or two feet, lives in the water, and is very voracious. It is found in the Ohio and the lakes. *Siren lacertina*, an eel-shaped animal, having external gills and two small feet, situated at the anterior part of the body. It conceals itself in the mud, but occasionally visits both land and water. It inhabits the Southern States. Two other species of siren are found in the same district. *Amphina means*, likewise an eel-shaped animal, but it has four very small rudimentary feet, which have two toes each. It burrows in the mud, in swamps, or in the vicinity of streams, and occasionally visits the dry land. It grows to the length of three feet, and is found in the Southern States. A second species, a *tridactyla*, distinguished from the former by having three toes on each foot, has been discovered in Arkansas.

Salamba, a kind of fishing apparatus, used on the banks near Manila, P. I., fitted on a raft composed of several tiers of bamboos. It consists of a rectangular net, two corners of which are attached to the upper extremities of two long bamboos, tied crosswise, their lower extremities being fastened to a bar on the raft, which acts as a hinge; a movable pole, arranged with a counterpoise as a sort of crane, supports the bamboos at the point of junction, and thus enables the fishermen to raise or depress the net at pleasure. The lower extremities of the net are guided by a cord, which, being drawn toward the raft at the same time that the long bamboos are elevated by the crane and counterpoise, only a small portion of the net remains in the water, and is easily cleared of its contents by means of a landing net.

Salamis, or **Pityoussa** (modern name KOLURI), an irregularly shaped, mountainous island of ancient Greece, off the coast of Attica. Its area is about 30 square miles; chief town Koluri. It had anciently two principal towns, Old and New Salamis. It is remembered chiefly on



COIN OF SALAMIS.

account of the great naval battle between the Greeks and Persians, which was fought with great bravery (480 B. C.) a few days after the battle of Thermopylæ, but in which the Persians were entirely defeated.

Sal Ammoniac, known also as chloride of ammonium, and sometimes as hydrochlorate of ammonia, is used in medicine and in chemistry to a considerable extent.

It is obtained from the ammoniacal liquor of the gas works by adding hydrochloric acid and then subliming it in iron pots, or by adding sulphuric acid and then subliming the ammonium sulphate with sodium chloride in the same way; on a small scale it may be made by adding hydrochloric acid to a solution of ammonia. It occurs in colorless, odorless, translucent fibrous masses, with an acrid saline taste, and soluble in water. It is used as an expectorant in chronic bronchitis and pneumonia, as a diuretic, diaphoretic, and alterative in rheumatism, and as an alterative in neuralgia; it is also given in catarrhal conditions of the gastro-intestinal tract and in various hepatic diseases. While being dissolved in water it greatly lowers the temperature, and hence in solution can be used as a refrigerant. The dose is 5 to 20 grains given in solution. In chemistry it is largely used as a test. See AMMONIA.

Salangane, a species of swift (*Collocalia fuciphaga*) common throughout the Eastern Archipelago, and famous as the producers of the "edible bird's nests." See BIRD'S NEST.

Salanx, in ichthyology, a genus of *Salmonidæ*, with a single species, *S. chinensis*, a small whitish fish, known on the coast of China as whitebait. It lives at a considerable depth and approaches the coast only at certain seasons. The scales are very delicate and deciduous.

Salawatty, an island off the W. extremity of New Guinea, to the Dutch portion of which it is regarded as belonging; area about 750 square miles. Pop. 5,000.

Salband, name given by miners to the band of altered rock or other material which often separates the contents of a mineral vein or lode from the rock-mass which the vein traverses. Selvage and flucan are terms used in the same sense.

Saldanha Bay, a bay of the Atlantic, on the W. coast of Cape Colony, South Africa, 80 miles N. of Cape Town. It forms a fine natural harbor, with excellent shelter and anchorage at all seasons, but is at present little frequented on account of scarcity of water and fuel.

Saldanha Oliveira e Daun, Joao Carlos, Duke of, a Portuguese statesman; born Nov. 17, 1790. He was a grandson of the "Great Marquis," Pombal, and great-grandson of the Austrian Marshal Daun; was educated at Lisbon and entered the army. When the French invaded Portugal he took the patriotic side and fought with distinction at Busaco, San Sebastian, Nive, etc. From 1817 to 1822 he was in South America and took a leading part in the struggle between Brazil and Montevideo, after the capture of which last town he was nominated viceroy of the province. When,

however, Brazil declared herself independent of Portugal, Saldanha returned to Lisbon, and in 1825 was appointed governor of Oporto. A moderate constitutionalist, he took the part of Dom Pedro against Dom Miguel, helping to defend Oporto in 1833, beating off repeated attacks on Lisbon (for which he was created marshal), gaining the victories of Pernes and Almoester, taking Leiria and Santarem, and finally forcing Miguel to sign the convention of Evora Monte (May 26, 1834) and leave Portugal. During 1836-1846 the extreme democratic party were in power and Saldanha lived partly in exile, partly in retirement, partly employed on diplomatic and other public business abroad. Meanwhile Portugal was in a most unsettled and disorderly state. Saldanha returned home in 1846; and from that time down to 1856 was alternately at the head of the government (1847-1849, 1851-1856), being supported chiefly by England, and in armed opposition to his political opponents. During the reign of Pedro II. he held no great office of state, and under King Louis was kept abroad as ambassador at Rome and London, except that he was prime minister for some months in 1870. He had been created a duke in 1846. He died in London, Nov. 28, 1876.

Sale, in law, that transaction by which the ownership of property is transferred from one person to another in consideration of a money payment made by the buyer to the seller. If it be a commutation of goods for goods, it is more properly an exchange. In order to the validity of a sale, it is necessary that the parties act in good faith; for it is a maxim in law that fraud vitiates all contracts. Neither is a sale valid if the subject matter of it is illegal or prohibited, or if an essential part of it involves an illegal act. In order to constitute a sale, the consent of each of the parties is required; and hence each must be legally qualified to consent.

Salé. See **SALLEE**.

Sale, George, an English lawyer; and student of Arabic and Mohammedan history; born probably in Kent, about 1680. He is most celebrated as the translator of the Koran, his version of which is still a standard; his introduction is particularly comprehensive, and appreciative of the Mohammedan religion. He contributed the Oriental biographies to the translation of Bayle's "General Dictionary," which was published in London in 10 volumes in 1734; and was one of the learned men selected to make the English "Universal History," but his part in the work was not published till 1739, after his death. He died in London, Nov. 14, 1736.

Sale, Sir Robert Henry, a British military officer; born in 1782. He entered the

army at a very early age, and his brilliant military career supplies some stirring pages in the history of the British Indian empire of the first half of the 19th century. In India, Burma, Afghanistan, wherever he was employed, he distinguished himself, especially in Afghanistan, where he forced Dost Mohammed Khan to surrender, and inflicted a crushing defeat on Akbar Khan at Jelalabad (1842), subsequently assisting in the recapture of Kabul. He died in 1846.

Salem, a city, port of entry, and one of the county-seats of Essex co., Mass.; on Massachusetts Bay and on the Boston and Maine railroad; 17 miles N. E. of Boston. It contains a State Normal School for Girls, court house, a reformatory, custom house, an orphan asylum, hospital, almshouse, the Peabody Academy of Science, the Essex Institute (in which are a large library and collection of relics and portraits); the East Indian Marine Society, the Salem Atheneum, Plummer Hall, the Essex Southern District Medical Society, the Essex Agricultural Society, the Marine Society, waterworks, electric lights, several National and savings banks, and the first street electric railroad laid in the United States. It has manufactories of glue, furniture, trunks, shoes, chemicals, railroad cars, castings, white lead, lead pipe, jute, cordage, leather machinery, leather, and cotton goods, and an assessed property valuation of over \$29,000,000. With the exception of Plymouth, Salem is the oldest settlement in New England. It is noted for its many historical interests. Its first house was erected by Roger Conant in 1626, and two years later John Endicott founded the first permanent settlement. The framework of the first church, built in 1634, is still intact. The witchcraft delusion arose here in 1692, and 19 persons were executed because of it. On Oct. 7, 1774, the Massachusetts House of Representatives with John Hancock in the chair met in Salem and declared the independence of that province. On Feb. 14, 1775, the British, in their search for war munitions, were foiled at the North Bridge and forced to withdraw. During the Revolutionary War over 150 privateers sailed from Salem and captured in all 445 English vessels. In 1785 the first vessel from the United States to India and China left this port, and for many years Salem merchants had a monopoly of trade with those countries. Salem is also noted as the birthplace of Nathaniel Hawthorne and Joseph H. Choate. Pop. (1900) 35,956; (1910) 43,697.

Salem, a city and county-seat of Salem co., N. J.; on Salem creek, and on the West Jersey and Seashore railroad; 32 miles S. of Philadelphia. Here are the Tyler public library, a high school, a Friends' preparatory school, waterworks, electric lights,

Salem

National banks, and several weekly newspapers. The city has an iron foundry, oil cloth factory, hosiery mill, a number of vegetable and fruit canneries, and several large glass plants, and an assessed property valuation of over \$3,000,000. Pop. (1890) 5,516; (1900) 5,811; (1910) 6,614.

Salem, a city, capital of the State of Oregon, and county-seat of Marion co.; on the Willamette river, and on the Southern Pacific railroad; 50 miles S. of Portland. Here are the State Capitol, the State Institution for Deaf Mutes, the State Institution for the Blind, the State Penitentiary, the State Insane Asylum, the State Reform School, the Chemawa Indian Training School, public hospital, waterworks, street railroads, electric lights, National and State banks, and daily, weekly and monthly periodicals. The city has daily steamer connection with Portland during most of the year. It has foundries, lumber mills, machine shops, and manufactories of sashes and doors, farm tools, and leather goods, and an assessed property valuation of nearly \$2,000,000. Pop. (1890) 4,415; (1900) 4,258; (1910) 14,094.

Salem, a town and county-seat of Roanoke co., Va.; on the Roanoke river, and on the Norfolk and Western railroad; 6 miles W. of Roanoke. It is noted for its beautiful scenery, salubrious climate, and its sulphur and chalybeate springs. Here are ROANOKE COLLEGE (*q. v.*), Baptist and Lutheran Orphanages, street railroad and electric light plants, National and State banks, and weekly and monthly periodicals. The town has manufactories of carriages and wagons, machinery, wool, leather, iron, bricks, etc. Pop. (1890) 3,279; (1900) 3,412; (1910) 3,849.

Salem Witchcraft. See WITCHCRAFT.

Salep, a substance obtained from the tuberous roots of several species of orchis, especially *O. mascula*, and the finest is obtained from Asia Minor. It occurs in commerce in small oval balls of a whitish-yellow color, of a horny aspect, hard, with a faint peculiar smell, and a somewhat insipid taste. It is much valued in the East for its supposed general stimulant and nutritious properties. For use it is ground into a fine powder, and mixed with boiling water, sugar and milk being added according to taste. It is to some extent used in Europe as a food for weakly persons.

Saleratus, a salt intermediate in composition between a carbonate and a bicarbonate of potash, prepared from pearl-ash by exposing it to carbonic acid gas; much used in making bread, to neutralize acetic acid, or tartaric acid, and thus render the bread light by the escape of the carbonic acid gas.

Salerno (ancient Salernum), a city of Southern Italy; on the gulf of the same

Saleyer Islands

name, 33 miles S. E. of Naples. A hill behind the town is crowned by an old Norman castle. The beautiful Gothic cathedral of St. Matthew (whose bones were brought from Pæstum in 954) was erected by the Normans (1076-1084), and has in front of it a quadrangle of porphyry and granite pillars and inside it monuments of Gregory VII. and Margaret of Durazzo. One of its doors is of bronze, Byzantine work. The city was celebrated in the Middle Ages for its university (founded in 1150, closed in 1817), but especially for its school of medicine (*Schola Salernitana*), which was long the first in Europe. In the neighborhood are the ruins of PÆSTUM (*q. v.*). There are a couple of small harbors. Cotton is spun. Originally a Roman colony (194 B. C.), Salerno figures little in history till after it was taken by Robert Guiscard, who made it his capital. But the removal of the Norman court to Palermo and the sack of the city by the Emperor Henry VI. struck serious blows at its prosperity, and a third came from the decay of the medical school in the 14th century. Pop. (1909) 42,727.

Salerno, Gulf of, a nearly semi-circular indentation, separated from the Bay of Naples by the promontory ending in Point Campanella. On its shores stand Amalfi and Salerno.

Sales, St. Francis de. See FRANCIS DE SALES, ST.

Salesian Nuns, the nuns of the order of the Visitation of the Virgin Mary, founded by Francis de Sales and his friend Madame de Chantal, one of his disciples, in 1610, at Annecy, in Savoy, as a refuge for widows and sick females. In the 18th century there were 160 convents and 6,600 nuns of this order. There are still Salesian nuns in the principal cities of Italy, devoting themselves to the healing of the sick and the education of young girls.

Salette, L^e, an Alpine village of France, department of Isère, 28 miles S. S. E. of Grenoble. Here on Sept. 19, 1846, the Virgin is alleged to have appeared to two peasant children; from that time the spot was visited annually by thousands of pilgrims. In 1852-1861 a pilgrimage church was built, in the Romanesque style, at an elevation of 5,920 feet. The alleged appearance of the Virgin was, however, discredited by Pope Leo XIII. in 1879.

Saleyer, or Salayer, Islands, a group of islands in the Indian Ocean; S. of Celebes, from which Great Saleyer is separated by the Saleyer Strait. They are about 30 in number; pop. about 50,000 Mohammedan Malays governed by native rajahs under a Netherlands agent. Ebony, teak, indigo, coffee, earth fruits, and cotton, are among the products.

Salian Hymns

Salian Hymns, hymns which were sung at the annual festival by the Salii in honor of Mars and other deities and distinguished men. They were accompanied by warlike dances, clashing of shields, etc.

Salians, or **Salian Franks**, the name given to that section of the Franks who from the 3d to the middle of the 4th century were settled on the left bank of the Lower Rhine. Their origin is uncertain, but it is known that the earliest Frankish kings were Salian Franks.

Saliant, in heraldry, a term applied to a lion or other beast represented in a leaping posture with his right forefoot in the dexter point and his left hind foot in the sinister base of the escutcheon.

Salicaceæ, a natural order of apetalous exogens, distinguished by a two-valved capsule, and numerous seeds tufted with long hairs. The species are trees or shrubs, inhabiting woods in the N. districts of Europe, Asia, and America. Only two genera are included in the order, *Salix* or willow, and *Populus* or poplar.

Salicin, in chemistry, $C_{13}H_{18}O_7 = C_6H_7O(OH)_4.O.C_6H_4CH_2OH$, a substance discovered by Leroux, and existing ready formed in the bark and leaves of most varieties of willow and several poplars. It may be produced artificially by the action of nascent hydrogen on helicin, or by boiling populin with lime or baryta water. It crystallizes in colorless prisms of bitter taste; it melts at 198° , and is soluble in water and alcohol, insoluble in ether and oil of turpentine. Heated to 260° , it gives off water together with acid vapors, and leaves a yellow residue, insoluble in water, finally turning brown and carbonizing.

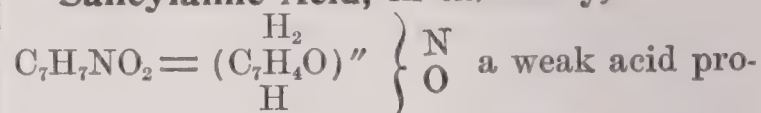
Salic, a term applied to a law or code of laws established by the Salian Franks; specifically applied to one chapter of the Salian code regarding succession to certain lands, which was limited to heirs male, to the exclusion of females, chiefly because certain military duties were connected with the holding of those lands. In the 14th century females were excluded from the throne of France by the application of the Salic law to the succession of the crown.

Salicornia, in botany, marsh samphire; glasswort; a genus of *Chenopodiaceæ*. Annual or perennial leafless herbs, with cylindrical, jointed, succulent stems. Flowers bisexual, minute, in threes at the base of the internodes. Perianth fleshy, three- or four-lobed; stamens one or two; styles two. Fruit a compressed utricle, inclosed in the enlarged perianth. From salt marshes, etc., chiefly in the temperate zones. Known species five or six. Various species furnish soda in large quantities; *S. brachiata*, common along the coasts of India and those of Indian salt lakes, does so. *S. indica* (Ar-

Salicylic Ethers

throcneum indicum) might be similarly used.

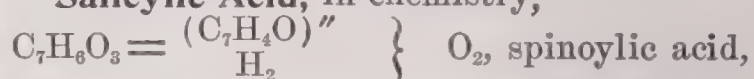
Salicylamic Acid, in chemistry,



duced by the action of strong alcoholic ammonia on wintergreen oil (methylsalicylic acid). It crystallizes in yellowish-white laminae, having a strong luster, insoluble in cold water, soluble in boiling water, alcohol, and ether, melts at 132° , and boils at 270° . Strong acids and alkalies convert it into acid salicylate of ammonia.

Salicylate of Soda, $2NaC_7H_5O_3.H_2O$; sodium salicylate, prepared by mixing 100 parts of pure salicylic acid with sufficient water to form a paste, and then adding 104 parts of pure sodic carbonate. It forms small colorless, or nearly colorless, crystalline scales, inodorous, and possessing a sweetish saline taste, soluble in 15 parts of cold water and six parts of alcohol, very soluble in boiling water, the solutions being neutral or very faintly acid. Perchloride of iron colors a concentrated solution reddish-brown, and a dilute solution violet. Like salicylic acid it is a powerful antiseptic, and is frequently added to beers, wines, etc., to preserve them. It is highly recommended as a specific for rheumatism, the dose varying from 10 to 30 grains.

Salicylic Acid, in chemistry,



ortho-hydroxy-benzoic acid, a dibasic acid existing ready formed in the flowers of *Spiraea ulmaria*, and obtained synthetically by the oxidation of saligenin, or by heating sodium phenol to 180° in a stream of carbon anhydride. It has a sweetish-sour taste, and crystallizes in colorless four-sided prisms; is slightly soluble in cold, more so in boiling water, very soluble in alcohol and ether, melts at 158° , and sublimates at 200° in slender needles having a strong luster. Ferric salts impart to its aqueous solution a deep violet color. The salicylates are all crystalline and soluble. Salicylic acid is employed as an antiseptic and antiputrefactive agent. One grain added to each ounce of a fermenting liquid will at once arrest fermentation. It has the power of preserving for a time milk, fresh meat, albumen, etc., and is used in the surgery, either alone or mixed with starch, to destroy the fetid odor of cancerous surfaces or uncleaned wounds.

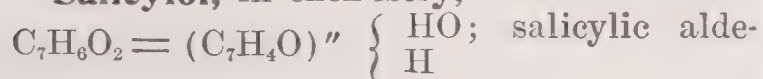
Salicylic Ethers, ethers produced by distilling salicylic acid with an alcohol and strong sulphuric acid. (1) Methylsalicylic acid, $C_8H_8O_3$; gaultheric acid. This ether, which exists ready formed in oil of wintergreen, is a colorless oil having a penetrating odor and a sweet aromatic taste, sp. gr. 1.18 at 10° , slightly soluble in water,

Salicylites

very soluble in alcohol and ether, and boiling at 222°. (2) Ethylsalicylic acid, $C_9H_{10}O_3$; a colorless oil, sp. gr. 1.184 at 10°, sparingly soluble in water, very soluble in alcohol and ether, and boiling at 225°. (3) Amylsalicylic acid, $C_{12}H_{16}O_3$; colorless, strongly refracting liquid, having an agreeable odor, heavier than water, and boiling at 270°.

Salicylites, compounds formed by the action of salicylol on metallic oxides and hydrates, those of the alkali metals being moderately soluble in water, the others insoluble. (1) Salicylite of ammonia, $C_7H_5(NH_4)O_2$, obtained by shaking salicylol with strong ammonia at a gentle heat, crystallizes in yellow needles, insoluble in alcohol, and melting at 115°. (2) Salicylite of copper, $C_{14}H_{10}Cu''O_4$, is obtained by agitating an alcoholic solution of salicylol with aqueous cupric acetate. It crystallizes in iridescent green needles, very slightly soluble in water and alcohol.

Salicylol, in chemistry,



hyde; salicylous acid; volatile oil of spirææ; obtained by distilling the flowers of *Spiræa ulmaria*, or by the oxidation of saligenin, with a mixture of potassic dichromate and sulphuric acid. It is a colorless aromatic oil, sp. gr. 1.173 at 15°, solidifies at -20°, boils at 196°, and is soluble in water, alcohol, and ether. It is inflammable, burning with a bright but smoky flame, gives an intense violet coloration with ferric salts, and forms compounds with strong bases.

Salimeter, an instrument for measuring the amount of salt present in any given solution. They are imperfect instruments, each requiring to be graduated for the particular salt which it is required to test.

Salina, a city, and county-seat of Salina co., Kan.; on the Smoky Hill river, and on the Missouri Pacific, the Union Pacific, the Atchison, Topeka, and Santa Fé, and the Chicago, Rock Island and Pacific railroads; 118 miles W. of Topeka. It contains the Kansas Wesleyan University (M. E.), Normal University, St. John's School (P. E.), street railroads, electric lights, numerous churches, National and other banks, and daily and weekly newspapers. Salina has a foundry and machine shops, paper, flour, and planing mills, and several grain elevators. Near the city are important gypsum quarries and salt springs. Pop. (1890) 6,149; (1900) 6,074; (1910) 9,688.

Salina Formation, a name given in North America to one of the subdivisions of the Silurian system, which appears to be equivalent to the lower portion of the Ludlow rocks of the British series. See SILURIAN SYSTEM.

Saline Purgatives

Salinas, a river in California which enters Monterey Bay about 76 miles S. E. of San Francisco. It is 150 miles long.

Saline, the name of several rivers in the United States. (1) A river in Arkansas, whose source is made up of several tributaries near the N. border of Saline county. Its course is S. E. and S. It crosses Grant Dorsey, and Bradley counties, and flows into the Ouachita river in Bradley county, on its E. limit; length about 200 miles. (2) A river in the S. part of Illinois which flows S. E. between Galatin and Hardin counties, into the Ohio river, 9 miles S. of Shawneetown. Including its S. fork, it is 100 miles long. (3) A river in Kansas, rising in the W. part of the State, and flowing with an E. course through the counties of Trego, Ellis, Russell, and Lincoln. In Saline county it flows into the Smoky Hill river 7 miles to the E. of Salina; length, nearly 200 miles.

Saline, a term applied to a very popular effervescent powder used as a gentle aperient. It is sold under all kinds of fancy titles, but essentially consists of a mixture of bicarbonate of soda, sugar, and tartaric acid, with a minute trace of Epsom salts or chlorate of potash.

Saline Plants, plants which grow on or near the seashore, in the water of the sea or of salt lakes, or on the beds of dried-up lakes, and which are, therefore, used to supply a salt which is above the average in amount, and which therefore become to a certain extent modified in form and function, may if we choose be called saline plants, but the term is of no particular value. Few of them are strictly aquatic plants, except the marine algæ, or seaweeds, which grow immersed in salt water, either always or in certain states of the tide, and derive their nourishment from it through their fronds, and not by roots from the rock to which they are attached. Grass-wrack, however, is an instance of a phanerogamous plant living entirely and always immersed in salt water. Other phanerogamous plants grow chiefly or only on the seashore and in salt marshes. Some of these, however, as the sea kale, may be cultivated in gardens remote from the sea, but they succeed best when liberally supplied with salt. The steppes of Russia and Tartary, having in many places a strongly saline soil, are covered with a very peculiar vegetation. Among the ornaments of these steppes is *Halimodendron argenteum*, a shrub of the natural order *Leguminosæ*, often cultivated in gardens for its beautiful rose-colored flowers and silvery gray leaves. Saline plants have the tissues impregnated with salt.

Saline Purgatives, purgatives resembling hydragogues in their effects, but the action is much slighter. They are best combined with other aperients, and include

Saline Waters

phosphate of soda, tartrate of potash, sulphate of soda, sulphate of magnesia, citrate of potash, and cream of tartar, in small quantities.

Saline Waters, waters with salts in solution. Those which have sulphate of soda or sulphate of magnesia as their chief ingredients are at Epsom, Cheltenham, Leamington, Püllna, Seidlitz, Carlsbad, and Marienbad; those with sulphate or carbonate of lime, or both, are the thermal waters of Bath and Buxton; those with carbonate or bicarbonate of soda are Ems, Teplitz, etc.

Salinometer, a salt gauge, or instrument for measuring the quantity of salt that may

Salisbury

hair tree, is 60 to 80 feet high, with a straight trunk, a pyramidal head, and fan-shaped deciduous leaves, with forked veins.

Salisbury, a city and county-seat of Rowan co., N. C.; on the Southern railroad; 131 miles W. of Raleigh. It is in a mineral and agricultural section; contains Livingstone College for negro students, a State Normal School for Colored Pupils, National and other banks, and several weekly periodicals. It has a woolen mill, machine shops, foundries, tanneries, tobacco factories, etc. Pop. (1900) 6,277; (1910) 7,153.

Salisbury, or **New Sarum**, a cathedral city of England, the capital of Wiltshire,



SALISBURY CATHEDRAL FROM THE NORTHEAST.

be in solution in the water of a steam boiler, which is indicated by the specific gravity of the water. Common sea water contains $1/33$ of salt, and the water in the boiler should never be suffered to attain a degree of saturation above that represented by $2/33$ of salt, or two salt waters, as it is called.

Saliretin, in chemistry, C_7H_6O , a resinous body produced by the action of dilute acids on saligenin or on salicin. Insoluble in water and ammonia, soluble in alcohol, ether, and strong acetic acid, but reprecipitated from their solutions by water.

Salisburia, in botany, a genus of *Taxaceæ*. *S. adiantifolia*, the ginkgo, or maiden-

and a Parliamentary and municipal borough; in a valley near the confluence of the rivers Avon, Bourne, Wily, and Nadder, 84 miles W. S. W. of London. The plan of the city is very regular. Water originally ran through most of the streets, but the streams were covered over after the visitation of the cholera in 1849. The removal from Old Sarum took place in 1220, when the foundations of the new cathedral were laid. It was finally dedicated in 1260. The cathedral consists of a nave of 10 bays, choir, and Lady Chapel, with two aisles, and two transepts, each having a single aisle toward the E., the ground-plan being in the form of a double cross. The whole building is a perfect example of pure Early En-

glish style. The spire is the highest in England (400 feet), and leans $27\frac{1}{2}$ inches toward the S. The cathedral was restored by James Wyatt in 1782-1791, and again, beginning in 1863, by Sir Gilbert Scott, Mr. Street, and Sir Arthur Blomfield. There is a curious muniment room over the vestry containing a copy of the Magna Charta of King John, said to be that handed to Longespée, Earl of Salisbury, who was one of his witnesses. The library, built about 1450, is over the E. side of the cloisters, and contains about 5,000 volumes and many valuable MSS. The outside measurements of the cathedral are: Length 473 feet, width 111 feet; the height of the nave and choir inside is 81 feet. The cathedral stands apart from any other building in the midst of a beautiful close of about half a square mile in extent, encircled by a wall, within which stand the bishop's palace, an irregular building begun by Bishop Richard Poore (about 1220) and added to by many of his successors, the deanery and canons' houses, and many other picturesque buildings. The parish churches are St. Martin's, St. Thomas of Canterbury, a handsome Perpendicular building of the 15th century, and St. Edmund of Canterbury, formerly a collegiate church of secular canons. The other notable buildings are the council house; the county hall; the infirmary; the "Hall of John Hall" and Audley House, now the church house of the diocese, two fine examples of 15th-century domestic architecture; the old George Inn (now a shop), where Pepys stayed; St. Nicholas' Hospital; the market house; the poultry cross; and the Blackmore Museum, which contains one of the finest collections of prehistoric antiquities in England, the collection from America being probably unrivaled anywhere. The market place is spacious and planted with trees, and contains statues of the late Lord Herbert of Lea (Sidney Herbert) and Professor Fawcett, who was a native of the city. Here the Duke of Buckingham was beheaded in 1483, when Salisbury was the headquarters of Richard III. There are many charities and almshouses, and an endowed school for the choristers of the cathedral. The city chiefly depends on its agricultural trade, the former manufactures of cutlery and woollens being extinct. Pop. (1901) 17,117.

John of Salisbury was the confidential adviser of Becket. Margaret, Countess of Salisbury, was the mother of Cardinal Pole. The most notable bishops of Old Sarum were St. Osmund and Bishop Roger; of New Sarum, Hallam (whose death at the Council of Constance, 1417, is regarded by Dean Milman as fatal to many really effective reforms in the Church), Cardinal Campeggio, Jewell, Seth Ward (founder of the Royal Society), Burnet, Hoadley, Sherlock

Douglas, Burgess, Denison, Hamilton, and Moberly. Fox the martyrologist, Hooker, Fuller, Pearson, Isaac Barrow, Joseph Butler, and Liddon have been canons of the cathedral, where George Herbert was a frequent worshiper. Among distinguished natives and residents have been Massinger, William and Henry Lawes, Chiffinch (the chief agent in the intrigues of Charles II.), Harris, the philologist, Chubb "the Deist," and Henry Fawcett. Fielding resided at one time in the close, and Joseph Addison was educated at the grammar school.

Salisbury, Edward Elbridge, an American philologist; born in Boston, Mass., April 6, 1814; was graduated at Yale University in 1832, and then studied theology there till 1835, when he went abroad and took a course in Oriental languages. He was Professor of Arabic and Sanskrit at Yale University in 1841-1854; was for many years corresponding secretary of the Oriental Society, of which he became president. His publications include "Inaugural Discourse on Arabic and Sanskrit Literature" (1843); "Principles of Domestic Taste" (an address, 1877); "Genealogical and Biographical Monographs" (1885); magazine articles, etc. He died Feb. 5, 1901.

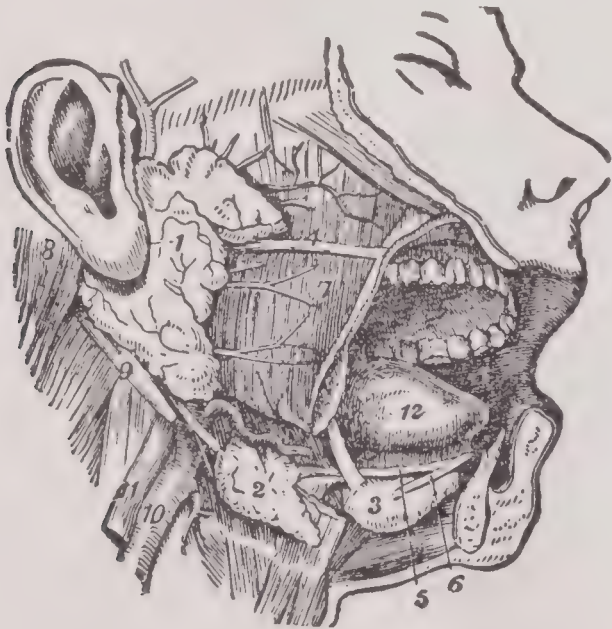
Salisbury, Robert Arthur Talbot Gascoyne Cecil, 3d Marquis of, an English statesman; born in Hatfield, Herts, En-



LORD SALISBURY.

gland, Feb. 3, 1830; was educated at Eton and Oxford. As Lord Robert Cecil he entered Parliament as member for Stamford in 1853, and gradually made his way till in 1866, on the formation of Lord Derby's third administration, he was appointed secretary of state for India. In 1865 he became Lord Cranborne and heir to the marquissate on the death of his elder brother. Owing to differences of opinion on the subject of the franchise he retired from the ministry, but on the death of his father in 1868 and his consequent elevation to the

House of Lords he returned to his old party associations. He resumed the secretaryship for India in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the end of that war, having become foreign minister, he insisted on the treaty which Russia had forced on Turkey being submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman became the recognized leader of the Conservative party. He became premier as well as foreign secretary on the fall of the Gladstone government in 1885. Gladstone succeeded again to power in the end of the same year, but in the June following was defeated on the Irish bills, when Salisbury again became premier and foreign secretary. His party maintained a majority by means of the adherence of the Liberal Unionists, who were represented in the cabinet by Mr. Goschen. In 1892 the majority in Parliament being in favor of a Home Rule bill for Ireland, Salisbury retired from office. In 1895, on the fall of the Rosebery ministry, he was recalled, and held the office till July 14, 1902, when he resigned. He died Aug. 22, 1903.



THE SALIVARY GLANDS.

1, the parotid gland; 2, the submaxillary gland; 3, the sublingual gland; 4, Steno's duct; 5, Wharton's duct; 6, Bartholin's duct; 7, masseter muscle; 8, mastoid process; 9, digastric muscle; 10, internal jugular vein; 11, external carotid artery; 12, the tongue.

Salisbury Plain, in South Wiltshire, England, an undulating tract of chalky down affording splendid pasture for sheep. There are rich valleys well timbered, but the high-lying land is too poor to repay cultivation. There are many ancient mounds and barrows, and in the midst of the plain stands **STONEHENGE** (*q. v.*). Salisbury Plain is one of the few places in England where the ancient sport of hawking is still pursued.

Salish Indians. See **FLATHEAD INDIANS**.

Saliva, the transparent watery fluid secreted by glands connected with the mouth. The quantity secreted in 24 hours varies; its average amount is probably from 1 to 3 pints. The purposes served by saliva are mechanical and chemical. It keeps the mouth in a due condition of moisture, and by mixing with the food during mastication it makes it a soft pulpy mass such as may be easily swallowed. The chemical action of saliva on the food is to convert the starchy elements into some kind of sugar. The salivary glands are compound tubular glands known as the parotid, the sub-maxillary, and the sub-lingual, and numerous smaller bodies of similar structure, and with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate, and root of the tongue. Salivary glands are absent in some mammals and reptiles, and in most fishes.

Salivation, the act or process of exciting or producing an unusual secretion and discharge of saliva, generally by the use of mercury; ptyalism; an abnormally abundant secretion and flow of saliva.

Salix, the willow, a genus of plants, order *Galicaceæ*. The species found in the United States are numerous, and commonly known as willows, osiers, and sallows. Their timber, though wanting in strength and durability, is applied to many useful purposes; and the wood of the flexible branches and twigs is largely employed for basket-work, hoops, etc. The sage willow, *S. tristis*, a small, downy shrub with a profusion of aments in spring appearing before the leaves, is the most common species in the Northern and Middle States. A peculiar crystalline alkaloid, resembling quinine in its properties, called salicine, has been obtained from the bark, leaves, or flowers of about 20 species of this genus.

Sallee, Salé, or Sla, a seaport of Morocco; on the Atlantic, at the mouth of the Bu-Ragreb, on the N. side of the river, opposite Rabat. It was for centuries notorious as a haunt of pirates, and gave its name to the Sallee Rovers, who carried the terror of their name into the English Channel, and who are known to every reader of "Robinson Crusoe." The people, 10,000 in number, are still fanatical and suffer no European to dwell within their walls.

Sallow, a common name for several species of willow. See **WILLOW**.

Sallow Thorn. See **SEA BUCKTHORN**.

Sallust, Caius Callustius Crispus, a Roman historian; born in Amiternum in 86 B. C. He became tribune in 52 B. C., and in the civil war sided with Cæsar. In 47 B. C. he was prætor elect, and in the following year accompanied Cæsar to the African war,

where he was left as governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, and after Cæsar's death lived in luxurious retirement. Sallust wrote several historical works in a clear and concise style. His "Catilinarian War" is a history of the Catiline conspiracy. The "Jugurtha, or Jugurthian War," is a history of the war against Jugurtha, King of Numidia, from 111 B. C. to 106 B. C. He died in Rome in 34 B. C.

Sally, a leaping or springing forth. Specifically, a sudden issue or rushing out of troops from a beleaguered place to attack the besiegers; a sortie; as, the garrison made a successful sally. Excursion from the ordinary track; range; deviation; digression; as, to make sallies into a country district. A spring or darting of intellect, fancy, or imagination; flight of liveliness or humor; sprightly exertion of the faculties; as, sallies of wit. Act of levity or extravagance; unseemly display of vivacity; an act of wild frolic or obstreperous gayety; an escapade; an overleaping of the bounds of propriety; as, sallies of hot-blooded youth.

Sally Lunn, a tea-cake; so called from Sally Lunn, a pastry cook of Bath, England, who used to cry them about in a basket at the close of the 18th century. Dalmer, the baker, bought her recipe, and made a song about the buns.

Sally Port, in fortification, an opening cut in the glacis through which a passage leads by a ramp from the terreplein to the covered way of the interior; a postern; an underground passage from a fortification for making sallies from the covered way. In nautical language, a port on each quarter for entering or leaving a fire vessel after the train is fired.

Salmagundi (a word of uncertain origin, unless it be derived from the Countess Salmagondi, lady of honor to Marie de' Medici and the inventor of the dish), a dish of minced meat, seasoned with pickled cabbage, eggs, anchovies, olive oil, vinegar, pepper, and similar ingredients. In an applied sense the word means pot-pourri, a medley, a miscellany.

Salmalia, in botany, a genus of *Bombacæ*. The honey of *S. malabarica*, a very large, deciduous tree found in India and Burma, is said to be purgative and diuretic, the bark and root emetic, and the gum aphrodisiac.

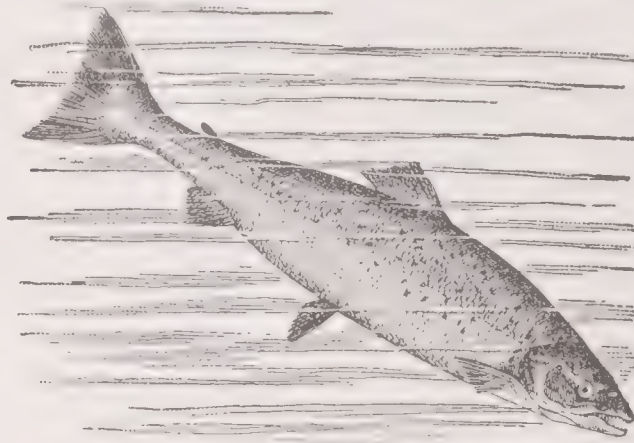
Salmi, or **Salmis**, a ragout of roasted woodcocks, larks, thrushes, and other birds and game, minced and stewed with wine, small pieces of bread, and other ingredients, intended to provoke the appetite.

Salmasius, Claudius (the Latinized name of Claude de Saumaise), a French scholar; born in 1588. In 1651 he succeed-

ed Joseph Scaliger as professor in Leyden University. In 1649 he wrote a defense of Charles I., which was brilliantly answered by Milton's "Defense of the English People." His other important works are: "Plinian Exercises," "Writers of Augustan History," "Observations on Attic and Roman Law," etc. He died in 1653.

Salm-Dyck, Constance Marie de Theis, Princess of (sām-dēk'), a French poet and miscellaneous writer; born in Nantes, Nov. 17, 1767; wrote a series of poetical "Epistles," one "To Women," another "On the Blindness of this Age." She also wrote: "My Threescore Years" (1833); "The Twenty-Four Hours of a Sensible Woman"; "Cantata on the Marriage of Napoleon." She died in Paris, April 13, 1845.

Salmon (*Salmo salar*), a well-known fish, forming the type of the family *Salmonidæ*. The salmon inhabits both salt and fresh waters, and ranks prominent among the food fishes of United States and

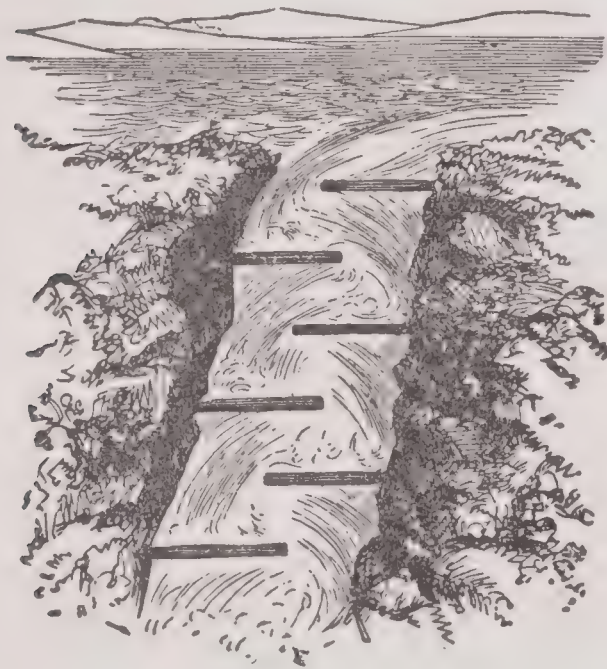


SALMON: SALMO SALAR.

other countries. It generally attains a length of from three to four feet, and an average weight of from 12 to 30 pounds, but these limits of size and weight are frequently exceeded. The typical color of the adult fish is a steel-blue on the back and head, becoming lighter on the sides and belly. Teeth are present in the upper and lower jaws, palate, and vomer or roof of the mouth; the edges of the tongue are also toothed or notched. The food consists of animal matter, and must vary with the change of habitat from salt to fresh water, and vice versa.

In the autumn the salmon quits the sea and ascends the rivers for the purpose of spawning, often having to surmount considerable obstacles, such as falls of some height, in its progress. In many streams they are now assisted in this by artificial structures known as "salmon ladders," or the like. The eggs are deposited in a shallow trough or groove excavated in the gravelly bed of the river. After spawning, the salmon both male and female return to the sea under the name of spent fish, foul fish, or kelts, the females being further dis-

tinguished as shedders or baggits. In from 70 to 150 days the young fish emerges from the egg, and in its embryo state it is not unlike a tadpole, being on the average about one and a quarter inches in length. About 50 days later it assumes the appearance of a fish and now approaches the definite or parr stage of its existence, beginning to be marked by transverse bars of dark color. It usually continues in the shallows of its native stream for two years after hatching, and during this period it attains a length of eight inches. When the season of its migration arrives, generally between March and June, the fins have become darker and the fish has assumed a silvery hue. It is now known as a "smolt" or "salmon fry." The smolts now congregate into shoals and proceed leisurely seaward. On reaching the estuary they remain in its brackish wa-



SALMON LADDER.

ter for a short time and then make for the open sea. Leaving its native river as a fish weighing it may be not more than two ounces, the smolt, after three months' absence, may return to fresh water as a "grilse" weighing four or five pounds. In the grilse stage, or "salmon peel," as it is sometimes called, the fish is capable of depositing eggs. After spawning in the fresh water the grilse again seeks the sea in the autumn, and when its second stay in the ocean is over it returns after a few months' absence as the adult salmon, weighing from 8 to 10 pounds. The salmon returns as a rule to the river in which it passed its earlier existence. The fertility of the fish is enormous; it has been calculated that over 150,000,000 of salmon ova are annually deposited in the Scotch river Tay alone, and of these only about a third come to life and attain the parr stage, while of these parrs only 20,000,000 become smolts; and in time only 100,000 remain as perfect salmon, of

which 70,000 are caught and 30,000 left for breeding purposes.

Salmon are caught by the rod and by means of nets. For purposes of commercial supply they are taken in nets of special construction and of various forms, the fishings being regulated by law not only as to their seasons and times, but also as to the forms and dispositions of the machines for the capture of the fishes. Stake nets supported on piles of wood and extending out into the sea, and "bag" or "drift" nets are the means most frequently employed in the British salmon fishery. The fishings are arranged according to districts, and in every district the annual close time is 168 days. In most rivers the close time is from Aug. 27 to Feb. 10. But in several cases these dates vary, and by special act the Tweed close time is from Sept. 14 to Feb. 15 for all but rod fishing. In former days the practice known as "burning the water" used to be resorted to in Scotch waters for the capture of salmon. It consisted in attracting the fishes by the glare of burning torches, when they were speared with the "leister" — a sharp fork — or taken by other means. The chief European salmon fisheries are those of the Tweed, Tay, North Esk, Dee, Spey, Severn, and some Irish rivers; there are important fisheries in some European and North American rivers. Immense quantities of salmon are annually taken and canned on the Columbia and Frazer rivers. In 1898 the total pack of the Pacific coast was about 1,800,000 cases, of 48 one-pound cans each; and the value of the Puget Sound pack in 1900 aggregated \$2,348,142. In Europe the fish is found between the latitudes of 45° and 75°, in North America in corresponding latitudes.

The flesh of the salmon when fresh is of a bright orange color, and is of highest flavor when taken from the sea-feeding fish. Of the same genus as the common salmon is the salmon trout, the common river trout, Lochleven trout, etc. What is known as the "land-locked" salmon, which is found in Norway, Sweden, Maine, and New Brunswick, and is so called because it remains in inland waters and does not descend to the sea, is by some regarded as a distinct species from the common salmon, by others not. In the waters of Northwestern America are several salmon belonging to a distinct genus, *Oncorhynchus*, including the quinnat or king salmon, blue-black salmon or red fish, silver salmon, dog salmon, and humpback salmon. The quinnat (*O. tshawytscha*) has an average weight of 22 pounds, but sometimes reaches 100 pounds. Both it and the blue-back salmon (*O. nerka*) are caught in immense numbers in the Columbia, Sacramento, and Frazer (especially in spring), and are preserved by canning. Attempts have been made to introduce the quinnat into Eastern North America and

Europe. The flesh of these salmon is indistinguishable from that of the common form. The salmon is one of the fishes that are important objects of PISCICULTURE (*q. v.*), and various species of the family have been introduced into waters not previously inhabited by them.

Salmon, Daniel Elmer, an American veterinary surgeon; born in Mt. Olive, N. J., July 23, 1850; was graduated at Cornell University in 1872, and at its Veterinary Department in 1876. He accepted a post in the United States Department of Agriculture in 1879; was made chief of the United States Bureau of Animal Industry in 1884; became president of the United States Veterinary Medical Association in 1898; and was for several years dean of the Veterinary Department of Columbian University. He is the author of "Diseases of Poultry" (1899); many official reports, scientific articles; etc.

Salmonidæ, in ichthyology, a family of *Physostomi*. Body generally covered with scales, head naked, no barbels; margin of upper jaw formed by the intermaxillaries mesially and by the maxillaries laterally; belly rounded; small adipose fin behind the dorsal; pyloric appendages generally numerous, rarely absent; air-bladder large, simple; pseudobranchiæ present. The ova fall into the cavity of the abdomen before exclusion. The genera are numerous, and valuable as food fishes. They are fresh water and marine (deep-sea). The former are peculiar to the temperate and Arctic regions of the Northern Hemisphere, one occurring in New Zealand, and many of them descend to the sea periodically or occasionally. They are found from the Cretaceous onward.

Salmon Trout, the *Salmo trutta*, a North European fish, much more common in Scotland than in England. Its habits are those of the salmon. It attains a length of about three feet; upper parts blackish, usually with a purplish tinge on the silvery sides, under part silvery. Called also sea trout, and in Wales and Ireland white trout. The flesh is pink, richly flavored, and much esteemed. Also the namaycush, or large lake trout of North America.

Salm-Salm, Prince Felix, a German military officer; born in Anholt, Prussia, Dec. 25, 1828. He attained his first rank as an officer in the Prussian army; later entered the Austrian service, but was forced to resign on account of pecuniary difficulties; in 1861 came to the United States and as a volunteer served in the Union army during the Civil War, attaining the brevet rank of Brigadier-General of volunteers. In 1866 he entered the service of Maximilian, the Emperor of Mexico; soon gained the confidence of the emperor, and was made chief of the imperial household and aide-de-camp to his majesty. On the overthrow of the

empire he returned to Europe, reentered the Prussian army as major in the Grenadier guards; participated in the battle of Gravelotte in the Franco-Prussian War Aug. 18, 1870, in which he was killed. He wrote: "My Diary in Mexico in 1867, Including the Last Days of the Emperor Maximilian, with Leaves from the Diary of the Princess Salm-Salm."

Salm-Salm, Princess (AGNES LECLERCQ), an American heroine; born in Baltimore, Md., Dec. 25, 1840. After winning some reputation as an actress, in 1862 she married Prince Salm-Salm and accompanied him in his campaigns. She was regularly commissioned as a captain in the volunteer service of the United States in recognition of her untiring devotion to the Union cause. She turned over the money received in payment of her services as captain and nurse to help the sick and wounded in the cause for which her husband fought. After the Civil War in the United States she joined her husband in the City of Mexico, and insisted on accompanying him, armed with a revolver, on a scouting trip to the interior. Separated from him and left behind in the City of Mexico, she had many serious and exciting adventures. At the battle of Gravelotte she was on the field with a corps of army nurses and was thus enabled to reach her husband's side after he was shot; not, however, in time to see him again alive. In 1876 she married Charles Heneage and afterward lived in Bonn. In the spring of 1899 she visited the United States where she was enthusiastically welcomed. One object of her visit was the restoration of six regimental battle flags to the regiments of which her husband, Prince Salm-Salm, was colonel, and which were presented to him during the war.

Salol, a white crystalline powder, obtained from phenol and salicylic acid. It is slightly greasy to the touch and tasteless. It is almost insoluble in water, but soluble in alcohol. It is a powerful antipyretic and antiseptic. Dose, 15 to 30 grains several times daily for gout, rheumatism and fever, fermentative diarrhœas, etc.

Salome, the mother of James the Elder and John the Evangelist, one of those holy women of Galilee who attended our Saviour in His journeys and ministered to Him; Matt. xxvii: 56. Some infer, from comparing Matt. and John xix: 25, that she was a sister of Mary the mother of Jesus.

Salomon, Johann Peter, an English violinist and composer; born in Bonn in 1745. When young he was attached to the service of Prince Henry of Prussia, for whom he composed several operas. He settled in London, and his series of Philharmonic Concerts there in 1790, for the first of which he arranged to have Haydn present, form an era in the history of music, in

Salona

that they led to the production of Haydn's 12 grandest symphonies. In 1800 Salomon retired from public life, but continued to compose songs, glees, and violin solos and concertos. He died Nov. 25, 1815, and was interred in Westminster Abbey.

Salona, an ancient and now ruined city of Dalmatia; at the head of a gulf of the Adriatic, about 3 miles N. E. of the spot on which Diocletian afterward built his gigantic palace of Spalato. It was made a Roman colony in 78 B. C., and later became the capital of Dalmatia and one of the most important cities and seaports of provincial Rome. But it was frequently captured by the Goths and other barbarians, and in 639 was completely destroyed by the Avars. The inhabitants who escaped took refuge in Hadrian's palace. The ruins were excavated during the 19th century; there are now to be seen remains of the former walls, the shell of the ancient Christian cathedral, traces of an amphitheater, and other structures. The city was early made the seat of a bishop, who was soon advanced to the dignity of archbishop of all Dalmatia. After the destruction of the city the archbishop converted the temple of Jupiter at Spalato into his cathedral.

Salonica (ancient Thessalonica; Turkish, Saloniki), a large seaport of Turkey in Europe, on a gulf of the Ægean Sea, 315 miles W. S. W. of Constantinople, rising from the sea in the form of an amphitheater, and forming a mixture of squalor and splendor. In Salonica may still be seen vestiges of Cyclopean and Hellenic walls, triumphal arches, and remains of Roman temples, Byzantine structures, and Venetian castles. Its harbor is excellent and its roadstead well sheltered, and next to Constantinople it is the most important city of European Turkey. The principal exports are cotton, corn, tobacco, timber, and wool; imports, sugar, coffee, indigo, calicoes, etc. The manufactures include cotton, silk, leather, carpets, etc. Thessalonica was founded in room of an older town in 315 B. C., and has had a somewhat eventful history. St. Paul preached the Gospel here, and addressed two of his epistles to the Christian converts of the place. On April 29, 1903, the city was thrown into consternation by the sudden appearance of a body of men, said to have been Bulgarians, who began exploding bombs in the crowded streets in front of the large hotels and cafés. As rumors of an impending massacre began to circulate a quantity of dynamite was thrown against the Ottoman Bank building. Over 100 persons were killed before the Turkish troops could restore quiet. Pop. (1900) est. 150,000.

Salpa, a genus of ascidian or tunicate mollusca forming the representative example of the family *Salpidae*. These ani-

Salsoda

mals are found floating in the Mediterranean and the warmer parts of the ocean, and are protected by a transparent gelatinous coat, perforated for the passage of water at both extremities. They are frequently phosphorescent, and are met with in two conditions known as single and chain salpæ. Each salpa is of oval or quadrate form, and the organs of the body occupy a comparatively small space within the body-cavity. *S. maxima* is the most familiar species.

Sal Prunella, niter which has been fused and cast into cakes or balls, and used for chemical purposes. See NITER.

Salse, an eruption of hot acidulated mud from a small orifice, generally in volcanic regions, and frequently accompanied by steam and gases at a high temperature, which act powerfully on the surrounding solid matters, disintegrating and decomposing them, and forming new compounds. In some districts the gases are inflammable, and flames issue from the orifices.

Salsette, an island N. of Bombay, British India, with which it is connected by a bridge and a causeway. It is a beautiful island, diversified by mountain and hill, studded with the ruins of Portuguese churches, convents, and villas, and rich in extensive rice fields, cocoanut groves, and palm trees; area, 240 square miles; pop. 111,000; chief town, Thana. Nearly 100 caves and cave-temples exist at Kánhari or Keneri, in the middle of the island, 5 miles W. of Thana. They are excavated in the face of a single hill, and contain elaborate carvings chiefly representations of Buddha, many of colossal size. There are caves in other localities besides those at Kánhari — e. g., at Montpezir, Kanduti, Amboli, etc. It was occupied by the Portuguese early in the 16th century, and was captured by the Mahrattas in 1739 and by the British in 1774.

Salsify, or **Salsafy**, the *Tragopogon porrifolius*, commonly called oyster plant, cultivated to a small extent in England, but much more largely on the Continent of Europe and in the United States. The root is excellent when cooked. It may be boiled and served with sauce, fried in batter, stewed, scalloped, or made into croquettes.

Salsilla, a name of several amaryllidaceous plants producing edible tubers, and belonging to the genus *Bomarea*, or to the closely-allied genus *Alstræmeria*. One species (*B.* or *A. edulis*) is cultivated in the West Indies, its roots being eaten like the potato; it is diaphoretic and diuretic. Other species, such as *B. Salsilla*, are natives of the Peruvian Andes, and are pretty twining plants with showy flowers.

Salsoda, the commercial term for impure carbonate of soda.

Salsola

Salsola, saltwort, a genus of plants which belongs to the natural order *Chenopodiaceæ*, and comprises about 40 species of mostly hardy herbs, shrubs, or sub-shrubs, of variable habit, mainly natives of saline districts in temperate regions. The ashes of *S. Kali*, the prickly saltwort, a British plant, and of *S. Soda*, a South European and North American species, were formerly much used in the production of an impure carbonate of soda known as barilla.

Salt, in chemistry, sodium chloride. In the plural it is applied in a general sense to compounds of a metal and a halogen, as sodium chloride, NaCl; and to compounds formed by the union of an acid and a base, nitrate of silver, AgNO₃. In its fuller signification the term suggests a compound which can suffer rapid double decomposition with another soluble substance, as when solutions of chloride of sodium and nitrate of silver are mixed together they at once decompose each other and form chloride of silver and nitrate of sodium. By an extension of meaning the name is sometimes applied to compounds, as chloride of ethyl, acetate of ethyl, and even to fats, as stearin, tristearate of glycerin. Popularly and medicinally the term salts refers to Epsom salts.

Salt as a commercial product is a very important industry in the United States. As early as 1620 the Jamestown colonists of Virginia established salt works at Cape Charles. Rock salt is abundant in West Virginia and Louisiana, and salt "licks" and springs are found in nearly all the States and Territories. The springs of Southern Illinois were worked by the French and Indians in 1720. The Kentucky salt springs were known and used before 1790.

One of the most remarkable salt works is at Salton, Cal. There is a lake, 28 feet below the sea-level, the brine of which rises in the bottom of the marsh from numerous springs in the neighboring foothills and quickly evaporating leaves deposits of almost pure salt, varying from 10 inches to 20 inches in thickness and thus forming a substantial crust. On this crystal lake a locomotive and train of cars is daily seen, while steam plows run backward and forward, dividing the surface into long shining heaps of salt which Indians shovel on to the flat cars. Each plow harvests daily over 700 tons of fine salt. The work is all performed by Coahuilla Indians, who labor 10 hours a day in a temperature of from 120 to 150 degrees without seeming to be affected by the heat.

The following table gives the production of salt by States in the year calendar 1908:

	Quantity. Barrels.	Value.
New York	9,076,743	\$2,136,738
Michigan	10,194,279	2,458,303

Salt Deposits

Ohio	3,427,478	\$864,710
Kansas	2,588,814	882,984
Louisiana	947,129	249,733
California	899,028	374,828
West Virginia	145,157	70,481
Texas	442,571	255,652
Utah	242,678	169,833
Other States	858,185	90,370

Total..... 28,882,062 \$7,553,632

For the customs and superstitions about salt, see SUPERSTITION.

Salt Deposits, Their Formation and Geology. When this planet emerged from its long aqueous night and the new-born internal forces began the work of creating the continents, the conditions essential to the formation of saline deposits prevailed. Salt was the predominating mineral held in solution by the water, and may even have been an element of the primary rocks. During the mighty uplifts numerous depressions filled with salty water were naturally elevated above the ocean level. Some of the lakes thus formed had the magnitude of seas. The most of them probably had no inlet or outlet. Others may have had both for a considerable portion of their existence, but a gradual diminution of the water supply would finally force the lake below the level of the outlet. Evaporation then produced a gradually strengthening brine, which eventually became so heavy that the salt crystals began settling to the bottom of the lake.*

All deposits formed in this manner are necessarily of great antiquity. Another class of deposits comparatively recent was formed from what were originally fresh-water lakes, and many of these lakes probably occupied valleys once dry. In such cases the salt came from tributary streams whose washings for hundreds of thousands of years, coupled with evaporation, finally produced conditions identical with those which obtained in the more ancient lakes.

There is yet a third and smaller class of deposits which have no particular age classification. Occasionally a landlocked bay was detached from the ocean by the formation of a sandbar across its mouth. It then became a great natural evaporating pan. The supply of salt water was derived from the influx of the tide over or through the sandbar. Since only water sufficient to replace that lost by evaporation could enter, the precipitation continued without interruption till some disturbance of nature either submerged the bay or elevated it above the ocean level.

Very little saline precipitation results from a body of water till it has become greatly reduced in size. If the water were originally of the same strength as that of the Atlantic Ocean, only approximately one-seventh of the first bulk would remain, pro-

* Under ordinary conditions, water can hold in solution about 25 per cent. salt. In salt making this is known as the point of "saturation."

vided there were no tributaries. To better illustrate this statement, suppose a lake 1,000 feet deep, with perpendicular sides and a level bottom. Not till evaporation had reduced the depth to about 143 feet would the real work of making a deposit begin. Of this remaining 143 feet, 35 feet would be solid matter, chiefly salt. Since the ancient lakes were probably on the same lines as those of the present day, they must originally have covered from two to six times the area of their salt beds, the deposit representing only the deepest portion.

If we allow that as a rule these lakes covered three times the area of their deposits and that their average depth was one-third of their greatest depth, we have the equivalent of the preceding paragraph. Based on this proposition, a deposit 50 feet thick would presuppose a lake having a maximum depth of 1,430 feet, by using the Atlantic's percentage of solid matter (0.035), though the ancient oceans were undoubtedly less saline. The greater part of the thicker deposits was probably contributed by streams (which were comparatively fresh) or by tides, as some of them would have required a depth of water much greater than now exists in the open ocean.

There is nothing improbable, consequently, in the supposition that some deposits 200 feet thick or more came from lakes which never had a depth exceeding 2,000 feet. In such a case, the original contents of the lake would account for 70 feet of the deposit, leaving 130 feet to be derived from other and generally less prolific sources. Tributary streams are a factor wanting in the case of landlocked bays, while a deposit of any given thickness which came from a lake originally fresh would require a much greater volume of water. These figures are, of course, conjectured, but they indicate the proportion the salt deposits must bear to the bodies of water from which they were derived.

Any estimate of the length of time consumed by nature in making a deposit would be at random. The size of the lake basin, the seasons, and the number and size of streams are important factors of which we have no knowledge. From the number of alternating strata of shale and salt found in some deposits, however, we know that there were numerous seasons of excessive rains, when the streams furnished sufficient water to raise the lake level many feet—perhaps to the overflow point. At such times the water became fresher and saline precipitation was indefinitely suspended. These seasons were not such in the modern meaning of the word, for they probably comprised scores or even thousands of years. The layers of mud which later became hardened into shale, were thickest and most

numerous near the mouths of the streams, but they occasionally covered the entire bed of the lake. Judge of the volume of water discharged and the amount of sediment it must have carried in order to cover areas of more than 1,000 square miles with a layer nowhere less than several feet thick.

Though the chief substance found in ocean water is chloride of sodium, it contains very small amounts of other minerals. Its average density is about 1.025. Of the 0.035 per cent. of solid matter in the Atlantic Ocean, less than 0.030 per cent. is salt. The various minerals and their percentages of the total matter are as follows: Chloride of sodium, 77.07; chloride of potassium, 3.84; chloride of magnesium, 7.86; sodium and magnesium bromide, 1.30; calcium sulphate (sulphate of lime or gypsum), 4.64; magnesium sulphate, 5.29. While this list fairly represents the ingredients of the ancient lakes, the percentages have very little bearing, owing to local causes. Particularly noteworthy is the greater proportion of gypsum in some of the deposits.

These minerals do not all separate from water at the same stage of evaporation or density. Distilled water at the temperature of 60° F. is the unit of comparison. The first mineral to separate is the calcium sulphate, when a density of about 1.13 has been reached—equivalent to 17 per cent. of solid matter. If it is deposited under a pressure of 10 atmospheres (about 146 pounds to the square inch), or at the bottom of a lake 335 feet deep, it will contain no water of crystallization and is called anhydrite. Usually, however, it includes a considerable percentage of water, and then it is more properly known as gypsum. Following the gypsum comes the chloride of sodium, the precipitation taking place in a density ranging from about 1.20 to 1.30. This includes the sodium bromide. The last to precipitate are the magnesium and the potassium. If the process were interrupted by an unusual inflow of fresh water, the order of precipitation would be repeated from the beginning. Judging from the number of strata of the different minerals found in some deposits, this was the rule rather than the exception.

For much of our knowledge regarding the formation of salt deposits, we have only to study the modern examples in various stages of completion. The Dead Sea, 40 miles long, 9 miles wide and 1,286 feet below the level of the Mediterranean, is a noted example. Its greatest depth is 1,100 feet, but all of the S. end below the peninsula of Lisan, or about one-fourth of its area, is very shallow, nowhere exceeding 13 feet. The principal contributing stream is the Jordan river, which is said to carry 52 parts chloride of sodium and 30 parts chloride of magnesium to every 100,000

parts of water. The water of the sea itself long ago reached the point of saturation and now contains 24 per cent. of solids. A little over one-third is chloride of sodium, the greater proportion being made up of chloride of magnesium and calcium chloride. This is excellent proof that the brine is very old, most of the salt already having been precipitated.

The Dead Sea is probably the remnant of a larger one, formed by the uplift which drained a large portion of Western Asia, joined that continent to Africa and nearly imprisoned the Red Sea. Ancient beach lines, from the level of the Mediterranean down, indicate the successive changes through which it has passed. It once had an outlet S. into the Gulf of Akabah by way of the narrow valley of Akabah. A saline plain which extends many miles to the S. shows that precipitation occurred long before it became contracted to its present area. The shallow S. end may once have been dry land (as the Bible seems to indicate), the resubmersion taking place during the eruption which destroyed Sodom and Gomorrah. This, however, would affect the level of the sea only a few feet, and proves that in 3,800 years there has been surprisingly little change.

The finest example of natural salt making, however, is to be found in our own country. Great Salt lake is the largest body of brine in the world. It has a singularly great elevation of 4,200 feet, considering the fact that salt lakes are usually near or below the ocean level. The area which it covers greatly varies from the wet to the dry seasons (winter and summer), but upon the average it is about 70 miles long and 30 miles wide. Four rivers flow into it—the Jordan from the S., the Bear from the N., and the Ogden and the Weber from the E., besides many minor streams. Despite this great influx of fresh water, the lake contains 23 per cent. of solid matter, nearly all of which is chloride of sodium. It is extremely shallow, the greatest depth being only about 35 feet, while the average is little more than one-third of that.

The basin which Great Salt lake originally occupied is of very irregular shape. The surface of the lake was then about 1,000 feet higher than it now is. Its extreme length was 346 miles and extreme width 145 miles, the total area being 19,750 square miles, or more than nine times its present size. At that level it remained thousands of years, making a well-defined shore line on the surrounding mountains. To this stage of its history geologists have given the name of Lake Bonneville. A second great and even more prolonged stage occurred when the lake had fallen to the 625-foot level, and this is known as the Provo shore line. During both stages it had an outlet N. by way of the Snake and

the Columbia rivers. Besides the seasonal changes, the level of the present lake fluctuates through periods of considerable length not yet clearly determined. In 1847 it covered an area of 1,700 square miles, but in 1869 the area had increased to 2,360 square miles, its extreme dimensions being: Length, 83 miles; width, 51 miles; depth, 49 feet. A decrease then began.

Salt deposits are common to nearly every formation of the earth's crust and constitute a sort of a geological stepladder which the average layman can understand. The point-blank assertion that millions of years were required to lay down the deposited portion of the earth is apt to stagger him. A stratum of rock hundreds of feet thick conveys no meaning to him because he knows nothing of the process by which it was formed. Judging from the slowness with which the modern deposits are being laid down, however, he can get an idea of the almost illimitable time that some of the ancient and larger deposits must have required. Many of them were completed long before either the continents or oceans were inhabited. Neither animal nor vegetable life could have survived the oft-repeated and awful convulsions of nature which emphasized their history. Placed in comparison, Niagara and the great chain of inland seas are as infants of today. Even the great glacier which preceded them and is supposed to have lasted about 30,000 years, belongs to the post-Tertiary or present period of the world's existence. Back of this are three great periods comprising a dozen different formations.

Salt Cake, sulphate of soda, in its prepared form, for the use of glass blowers and soap manufacturers.

Salter, William Mackintire, an American theologian; born in Burlington, Va., Jan. 30, 1853; was graduated at Knox College in 1871, and pursued courses at Yale and Harvard Divinity Schools in 1871-1876 and also studied abroad. He was lecturer of the Society for Ethical Culture of Chicago in 1883-1892; lectured before a similar organization in Philadelphia in 1892-1897; and in the latter year returned to the Society for Ethical Culture in Chicago. His publications include "On a Foundation for Religion" (1879); "Ethical Religion" (1889); "First Steps in Philosophy" (1892); "Anarchy or Government? An Inquiry in Fundamental Politics" (1895); etc.

Saltern, a salt manufactory where water is evaporated from brine and dry salt obtained. More especially a plot of retentive land, laid out in pools and walks, where the sea-water is admitted to be evaporated by the heat of the sun's rays. The operation is concluded in boilers.

Saltillo, capital of the Mexican State of Coahuila; 237 miles S. W. of Laredo, Tex-

Saltire

as, and 600 N. of the city of Mexico. It has a cathedral, an athenæum, a college, and the Madero Institute. Its manufactures include shawls and blankets, cottons, and flour. Near by is the battlefield of Buena Vista. Pop. (1900) 23,996.

Saltire, or **Saltier**, in heraldry, an ordinary in the form of a St. Andrew's cross, or the letter **X**, formed by two bends, dexter and sinister, crossing each other.

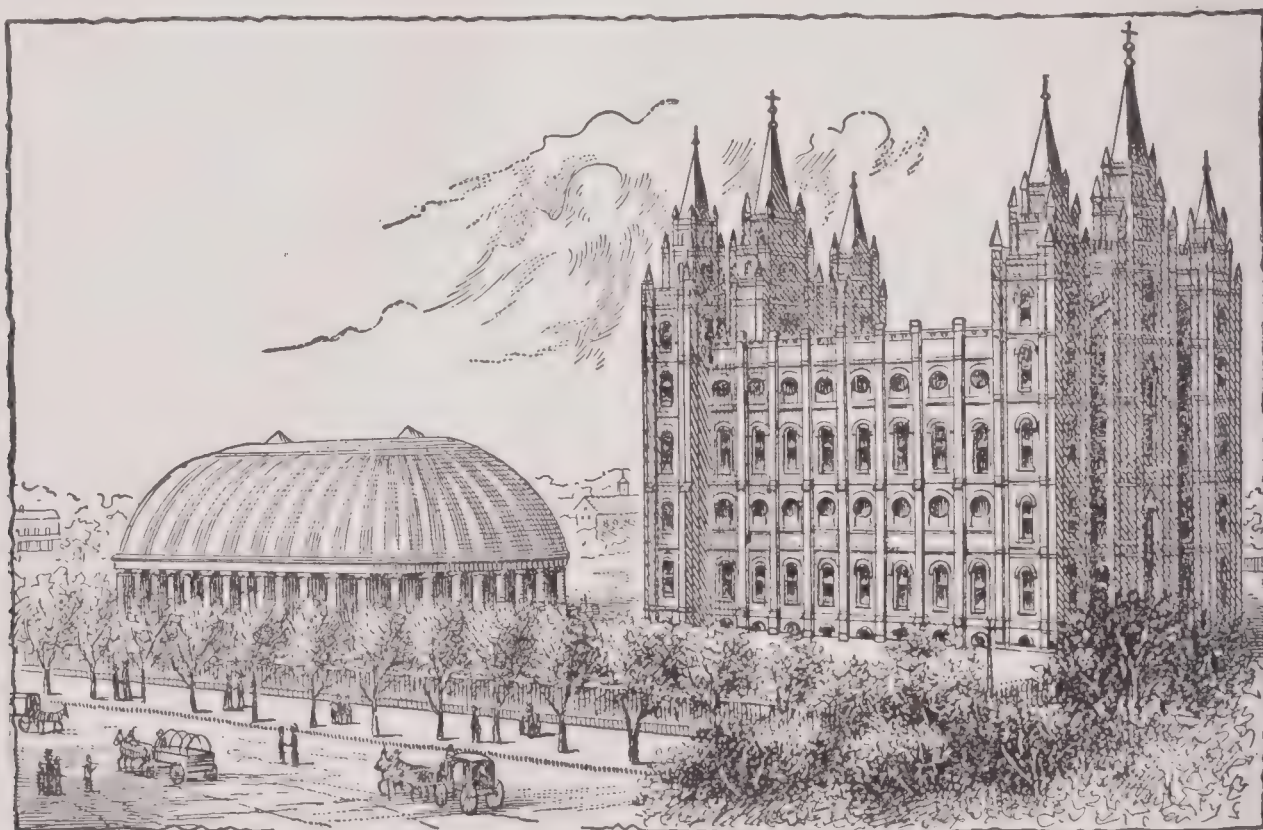
Salt Lake, Great. See GREAT SALT LAKE.

Salt Lake City, a city of Utah, capital of the State, county-seat of Salt Lake co.; the most important city between Denver and the Pacific coast, and headquarters of the Mormons (*q. v.*), or Latter-Day Saints.

Salt Lake City

The principal bathing resort on the lake is Saltair, to the W. of the city. It contains a magnificent pavilion, Moorish in style, with a great central dome, built at a cost of \$250,000 upon 2,500 ten-inch piles, at the foot of a pier extending 4,000 feet into the lake. Garfield Beach, another bathing resort, is S. of Saltair. The Lagoon, near Farmington, 18 miles N. of Salt Lake City, is a noted bathing resort owned by the Salt Lake and Ogden railroad.

Streets and Buildings.—The city is laid out on the checkerboard plan, with blocks 660 feet square, or $\frac{1}{8}$ mile in length, and streets 132 feet wide, bordered with shade trees and with brooks brought down from the mountains. In the residence quarters the houses are surrounded with gardens. In



SALT LAKE CITY: TABERNACLE AND GREAT TEMPLE.

It is situated in the N. part of the State, about 675 miles W. by N. of Denver and 830 miles E. by N. of San Francisco, at the W. base of the Wasatch mountains, 4,368 feet above sea level, about 12 miles S. E. of Great Salt Lake, near the E. bank of the Jordan river, which connects Great Salt and Utah lakes. It occupies a beautiful site in a fruitful valley, encircled by mountains and sloping gently toward the lake in the N. W. The Wasatch mountains approach the city N. and E., while the Oquirrh range is about 20 miles distant to the S. and S. W. The area of the city is about 46 square miles, and it has a population estimated in 1907 at 63,500. Fort Douglas, a United States military post, is on a plateau 3 miles to the E. Warm sulphur springs, just N. of the city, and hot springs, 2 miles farther to the N., are frequented for their medicinal properties.

the N. E. part of the city the blocks are smaller and the streets narrower. The focus of the city is Temple Block, near its center, and the streets bordering on it are known respectively as North, East, South, and West Temple street. All the other streets are named in relation to these, as First North street, Second North street, First East street, etc. There are a number of public squares and parks, Liberty park (110 acres) in the S. being the largest. The city also owns large tracts of land capable of being converted into parks.

Temple Block, the sacred square of the Mormons, is surrounded by a high adobe wall, enclosing the Tabernacle, Temple, and Assembly Hall. The unique Tabernacle, built in 1864-67, is an oval structure, 250 by 150 feet, and 70 feet high. Its wooden roof, resembling a tortoiseshell, is supported by 44 sandstone pillars. The interior, sur-

rounded by a gallery on three sides, contains one of the largest self-supporting arches in the world, one of the finest pipe organs in America, and over 8,000 seats, while about 12,000 persons can be admitted. It is used for religious services, also for lectures, sacred concerts, etc. The magnificent Temple was 40 years in building (1853-93), and has cost over \$4,000,000. It is of granite, 186 by 99 feet, with three pointed towers at each end. The loftiest of these (210 feet high) is in the center of the E. or principal façade, and is surmounted by a copper figure (12½ feet high) of the Mormon angel Moroni blowing a trumpet. The ornate interior is not accessible to Gentiles. It is used for the administration of religious rites (baptism, marriage, prayer), as well as for sermons, lectures, etc. The Assembly Hall, also of granite, can admit 3,000, and is used for worship. Among other buildings connected with the Mormon Church and in the vicinity of Temple Block are the Beehive House, the official residence of the president of the Mormon Church; the Lion House, containing the executive offices; the Tithing House, where the tithes are paid in kind; Zion University; and the huge shoe factory and warehouse of Zion's Coöperative Mercantile Institution. At the S. E. corner of Temple Block is the Pioneer Monument, surmounted by a copper statue of Brigham Young.

The most important public buildings are the new Federal building (post office, court house, etc.) and the imposing City and County building, in Washington square, erected at a cost of \$1,000,000. The houses of the Alta, Commercial, University, and Country clubs are notable, and the Y. M. C. A. has a building of its own. There are many palatial houses, as well as quaint old "dobbies."

Churches and Charities.—Besides the Mormon Church, numerous religious denominations are represented in the city, which is the seat of a Roman Catholic and a Protestant Episcopal bishop. Among the church edifices may be mentioned St. Mary's Cathedral (R. C.), the corner-stone of which was laid in 1900, and which was practically completed in 1907, with a steeple 220 feet high; St. Mark's Cathedral (P. E.), and St. Paul's Church (P. E.); First Congregational, and First Methodist Episcopal. The charitable institutions include the Hospital of the Holy Cross, Kearns' St. Ann's Orphanage, and the Judge Miners' Home and Hospital, all under Roman Catholic management; St. Mark's Hospital, established in 1869, under Protestant Episcopal management, the oldest hospital in the intermountain country; Latter-Day Saints (Mormon) Hospital; the undenominational Infants' Protective Association; and others. For charitable purposes the Mormon Church

has organized the city into 33 ecclesiastical wards, which render aid irrespective of creed.

Educational Institutions.—The public school system, based on the State free school law of 1890, is managed by an elective board of education having the power of taxation for school purposes. Free textbooks and supplies were introduced in 1892. There are some 24 school buildings, with about 350 teachers, about 13,000 pupils in the elementary schools, and 1,000 in the high school. The annual expenditure exceeds \$300,000. Of denominational and higher schools there are: St. Mary's Academy, All Hallows College (R. C.); St. Luke's Collegiate Institute, Westminster College (Presb.); Rowland Hall, for girls (P. E.); a Congregational school; and the Latter-Day Saints or Zion University, with over 1,000 students. The University of Utah occupies a site near Fort Douglas, on grounds covering 92 acres, donated by Congress out of the military reservation. In addition, the University received from the National government 255,836 acres of public lands. Its income is derived from these lands and from State grants of funds. There are published in the city 4 daily newspapers, besides a number of weeklies and monthlies. The "Deseret Evening News" is the oldest newspaper W. of the Missouri river.

Industries and Commerce.—The manufactures of the city include cars and general shop construction and repair by steam railroad companies, confectionery, coppersmithing and sheet iron working, flour and grist mill products, malt liquors, foundry and machine shop products, lumber and planing mill products, furniture, mattresses and spring beds, printing and publishing, tobacco, cigars, and cigarettes, boots and shoes, brick and tile, pottery and fire clay products, cement, lamps, mirrors, soap, etc. The city is the headquarters of several large mining companies, and there are a number of big smelters and mineral mills in the valley. On the lake shore near Saltair is a plant for the production of salt by solar evaporation. Electric power, developed from a mountain cataract 35 miles from the city, is used by many factories. The growth of the industrial activities of the city since 1880 is shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1880	166	\$ 860,000	928	\$426,000	\$813,000	\$1,610,000
1890	175	3,354,000	1,986	1,205,000	1,967,000	4,624,000
1900	432	4,049,000	2,977	1,601,000	2,744,000	6,109,000

Salt Lake City

The special United States Census of Manufactures of 1905 was confined to industries carried on under the factory system, to the exclusion of neighborhood industries and hand trades. Compared with the corresponding figures for 1900, the results are shown in the following table:

Year	Number of Establishments	Capital	Wage-Earners	Wages	Cost of Materials Used	Value of Products
1900	154	\$3,356,000	2,154	\$1,177,000	\$1,977,000	\$4,279,000
1905	192	5,337,000	2,776	1,704,000	3,515,000	7,544,000
Per cent. increase	24.7	59.0	28.9	44.7	77.8	76.3

In 1906, according to local report, there were engaged in all the industries of the city 15,969 persons, who received \$10,776,000 in wages, and turned out a product valued at \$55,475,000.

The city is a distributing center for a rich mining, stock-raising, and farming country. It has a large trade in groceries, dry goods and notions, hardware and mining machinery, farm implements and wagons, saddlery and harness, drugs and chemicals, lumber and building materials, furniture and carpets, cured and fresh meats, liquors and cigars, clothing, boots and shoes, crockery, confectionery, paints and oils, plumbing and electrical supplies, etc. The value of the wholesale trade in 1906 was estimated at \$49,500,000. In the same year there were 12 banks, including 4 National banks, with a total surplus, capital, and undivided profits of \$3,146,000, and deposits of \$36,882,000. The clearing-house exchanges for the year ending Sept. 30, 1906, amounted to \$267,961,000, an increase of \$74,652,000 over the preceding year. The city is an important and growing railway center, being entered by the Union Pacific, the San Pedro, Los Angeles, and Salt Lake, the Rio Grande Western, the Utah Central, and other railways. In 1907 new lines to Denver and San Francisco were under construction. The local and interurban railway service is adequate and increasing.

Administration and Public Interests.—The city is governed by a mayor, elected for two years, a unicameral council, a treasurer, auditor, recorder, and two justices of the peace popularly elected, and chiefs of fire and police, boards of public works and health, etc., appointed by the mayor and confirmed by the council. There is a special court for juvenile offenders. The water works are owned by the municipality, the

Salt Range

excellent supply being derived from small streams flowing out of the Wasatch mountains.

History and Population.—The first company of Mormons arrived in Salt Lake valley, July 24, 1847, after a journey of over 1,000 miles in 109 days from Nauvoo, Ill., across a wild and partly desert country, now comprised in Nebraska, Kansas, Colorado, and Wyoming. The farthest outpost of civilization was then on the Missouri river, and the Mormons had entertained the hope of founding an isolated theocratic state. Within five years from the date of their first settlement more than 5,000 of them were living in the city and valley, and till 1870 the population of the city was almost exclusively Mormon. But the discovery of gold in California, which started the emigrant trains across their country, and the mining development of the surrounding regions soon put an end to their isolation. At present about half the population of the city is estimated to consist of Gentiles. Population, 1860, 8,236; 1870, 12,854; 1880, 20,768; 1890, 44,843; 1900, 53,531; 1910 (census) 92,777. In 1900 the population consisted of 25,849 males and 27,682 females. Negroes numbered 278, Mongolians 236. The foreign born numbered 12,741—constituting 23.8 per cent. of the total population—the most numerous elements being 6,586 English, Scotch, and Welsh, 3,154 Scandinavians, and 963 Germans.

Saltpeter, in chemistry, KNO_3 , potassium nitrate or niter; found in comparatively small quantities as a natural product in various soils. It occurs more particularly in the East Indies, Egypt, Persia, and Spain. In the United States small local deposits are found in caverns in Indiana, Kentucky, Tennessee, Virginia, and elsewhere. Saltpeter is prepared artificially by decomposing native sodium nitrate ("Chile saltpeter" or cubic niter) with potassium chloride. It crystallizes in anhydrous six-sided prisms, and is readily soluble in water. Its chief use is in the manufacture of gunpowder and other explosives, but it is also employed in the making of fireworks and matches, as a preservative of food, and in other ways. When fused (at about 644°F.) and cast into molds, it forms sal prunella.

Salt Range, a mountain system in the Punjab, India, consisting of two main chains which run E. and W., and embrace between them an elevated table-land. It begins on the S. side of the Jhelum, runs W. to the Indus, and varies from 3,200 to 5,000 feet in height. Its appearance is exceedingly bleak and barren, but not without much savage grandeur. The system gets its name from the inexhaustible beds of rock salt that occur on the edges of the plateau.

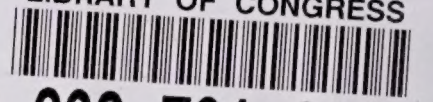
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